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THE COCCINELLIDAE OF THE THIRD MOUNT EVEREST EXPEDITION, 1924 (COLEOPTERA)

16 MAY 1963

A. P. KAPUR

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THE COCCINELLIDAE OF THE THIRD MOUNT EVEREST EXPEDITION, 1924 (COLEOPTERA)

BY

A. P. KAPUR

Zoological Survey of India, Calcutta.

Pp. 1–48 ; 17 *Text-figures*

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THE COCCINELLIDAE OF THE THIRD MOUNT EVEREST EXPEDITION, 1924 (COLEOPTERA)

By A. P. KAPUR

SYNOPSIS

The Coccinellidae of the Third Mount Everest Expedition, 1924, were collected from Sikkim and Darjeeling as well as from the higher and less explored parts of the Himalaya in Tibet. The collection includes fifty-one species, of which four have already been described as new by the writer, and sixteen more are described here for the first time. The collection comprises a mixture of palaearctic, oriental and endemic species, of which the endemic element represents about two-thirds of the total. The genera, however, are, with one exception, either palaearctic or oriental.

INTRODUCTION

THE Coleoptera of the British Mount Everest Expedition, 1921, were studied by Blair (1922) who reported, in all, 21 specimens belonging to eight species of seven different families. No Coccinellid was recorded from this collection. The Coleoptera of the Second Mount Everest Expedition, 1922, contained five species of Carabidae (*vide* Andrewes, 1923) and seven of Heteromera (*vide* Blair, 1923) and so far as I am aware, no Coccinellid was reported from this expedition either. The Coleoptera collected by the Third Mount Everest Expedition, 1924, were, however, remarkable for their numbers and variety. The Carabidae, reported upon by Andrewes (1930), alone constituted 105 species and varieties of which 54 species were new to science. The Heteromera, dealt with by Blair (1927), contained some 30 species of which nine were new.

The present account of the Coccinellidae of the Third Mount Everest Expedition, 1924, is based on the rich collections made by Major R. W. G. Hingston, the Surgeon Naturalist with the Expedition. The material deposited in the British Museum (Natural History), London, is in an excellent state of preservation. It comes from both the lower and better known parts of the Himalaya such as Darjeeling and Sikkim and from the high and less explored parts such as Tibet. The material actually before me contains 45 species of which 16 are new to science. Six other species of the genus *Cryptogonus* Mulsant (Tribe Aspidimerini) four of them new, were dealt with by me earlier (Kapur, 1948). The collection of Coccinellidae of the Third Mount Everest Expedition, therefore, contains 51 species of which 20 are new.

It is to be noted that the species occurring at higher altitudes (say 9,000 feet and above, mainly in Tibet) are either endemic or palaearctic and that in almost all cases the genera are palaearctic. On the other hand the species from lower altitudes (2,500–8,500 feet, mainly in Sikkim) are a mixture of endemic and oriental forms. In both the endemic element is large (36 species out of a total of 51).

My sincere thanks are due to the Keeper, Department of Entomology, British Museum (N.H.), London, and to Dr. E. B. Britton of the same department, for the loan of the material and for their co-operation. I am also grateful to Dr. M. L. Roonwal, Director, Zoological Survey of India, Calcutta, for giving facilities to complete this work.

SYSTEMATIC ACCOUNT

Table of Coccinellidae collected by the Third Mount Everest Expedition, 1924.

Name of species	Darjeeling dist.	Sikkim	Tibet	Altitude in feet	Remarks
Subfamily I—EPILACHNINAE					
1. *Epilachna dodecastigma* (Wiedemann)		×		4,000	Oriental
2. *Epilachna indica* Mulsant		×		4,000	Oriental
3. *Epilachna sikkimica*, sp. n.		×		2,500	
4. *Afissa bengalica* Dieke		×		4,000	
5. *Afissa congener* (Gorham)		×		4,000	
6. *Afissa gibbera* (Crotch)		×		8,000	
7. *Afissa hingstoni*, sp. n.			×	10,000	
8. *Afissula sanscrita* (Crotch)		×	×	3,500; 10,000	
9. *Afidentula himalayana* sp. n.	×	×		7,000–8,000	
Subfamily II—COCCINELLINAE					
Tribe 1—COCCIDULINI					
10. *Singhikalia ornata*, gen. et sp. n.		×		3,500; 5,000	
Tribe 2—NOVIINI					
11. *Rodolia guerini* (Crotch)		×		3,500	Oriental
Tribe 3—SCYMNINI					
12. *Pullus bourdilloni* Kapur		×		3,500	
13. *Pullus testacecollis*, sp. n.		×		6,000	
14. *Pullus hingstoni*, sp. n.		×		5,000; 6,000	
15. *Pullus*, sp.		×		8,500	
Tribe 4—ASPIDIMERINI					
16. *Cryptogonus postmedialis* Kapur		×		3,500–5,000	
17. *Cryptogonus quadriguttatus* Weise	×			4,000	
18. *Cryptogonus ariasi* (Mulsant)		×		5,000	
19. *Cryptogonus hingstoni* Kapur		×		5,000	
20. *Cryptogonus himalayensis* Kapur		×		3,500	
21. *Cryptogonus complexus* Kapur		×		5,000	

Name of species	Darjeeling dist.	Sikkim	Tibet	Altitude in feet	Remarks
Tribe 5—CHILOCORINI					
22. *Chilocorus hauseri* Weise		×		5,000	
23. *Chilocorus braeti* Weise	×	×		5,000; 7,000	
Tribe 6—SYNONYCHINI					
24. *Leis dimidiata* (Fabr.)		×		4,000	Palaearctic
25. *Aiolocaria hexaspilota* (Hope)		×		3,500–4,000	
26. *Aiolocaria dodecaspilota* (Hope)		×		3,500	
27. *Ballia gustavi* Mulsant		×		3,500	
28. *Oenopia luteopustulata* Mulsant		×		3,500; 5,000	
29. *Oenopia kirbyi* Mulsant	×			4,000	
30. *Oenopia sauzeti* Mulsant		×		4,000; 5,000	
31. *Oenopia quadripunctata* sp. n.	×			4,000	
32. *Coelophora sexareata* Mulsant	×	×		4,000; 5,000	
33. *Coelophora nitidicollis* sp. n.		×		7,000	
Tribe 7—HIPPODAMIINI					
34. *Hippodamia heydeni* (Weise)			×	14,500	Palaearctic
35. *Adonia variegata* (Goeze)			×	14,000–15,000	Palaearctic
Tribe 8—COCCINELLINI					
36. *Adalia tetraspilota* (Hope)		×		3,000	Palaearctic
37. *Lioadalia luteopicta* (Mulsant)			×	11,000–13,000	Palaearctic
38. *Synharmonia billieti* (Mulsant)			×	9,500	
39. *Synharmonia signatella* (Mulsant)	×	×		7,000; 11,000	
40. *Coccinella magnopunctata* Rybakow			×	14,000; 14,500	
41. *Coccinella tibetina*, sp. n.			×	14,000	
42. *Coccinella lama*, sp. n.			×	14,500–15,000	
43. *Coccinella nigrovittata*, sp. n.			×	14,500	
44. *Calvia sykesi* (Crotch)	×			7,000	
45. *Calvia shiva*, sp. n.		×		5,000	
46. *Calvia durgae*, sp. n.		×		5,000	
47. *Calvia trilochana*, sp. n.		×		5,000	
48. *Calvia pinaki*, sp. n.		×		5,000	
49. *Calvia pasupati*, sp. n.		×		5,000	
Tribe 9—PSYLLOBORINI					
50. *Halyzia straminea* (Hope)		×		5,000	
51. *Halyzia sanscrita* Mulsant		×	×	5,000; 10,000	Palaearctic

Subfamily **EPILACHNINAE**

Epilachna dodecastigma (Wiedemann)

Coccinella dodecastigma Wiedemann, 1823 : 73–74. [Type loc., Bengal].
Epilachna dodecostigma Mulsant, 1850 : 789. [Misspelling].
Epilachna dodecastigma (Wiedemann) Mulsant, 1853 : 248.
Epilachna dodecastigma Mulsant ; Korschefsky, 1931 : 28.
Epilachna dodecastigma (Wiedemann) ; Dieke, 1947 : 31.

Material. 1 ♀, Sikkim, Pedong, 4,000 ft., 29.vii.1924 (*R. W. G. Hingston*).

This example possesses all the seven black spots on the pronotum and the same number on each elytron, the seventh spot being the smallest and subapical. The spots in this species exhibit considerable variation in number and size ; the maximum number of spots in the pronotum is seven and on the two elytra 28. This species is thus easily confused with other species of the genus that possess the same number of elytral spots. For correct recognition of the species, therefore, characters other

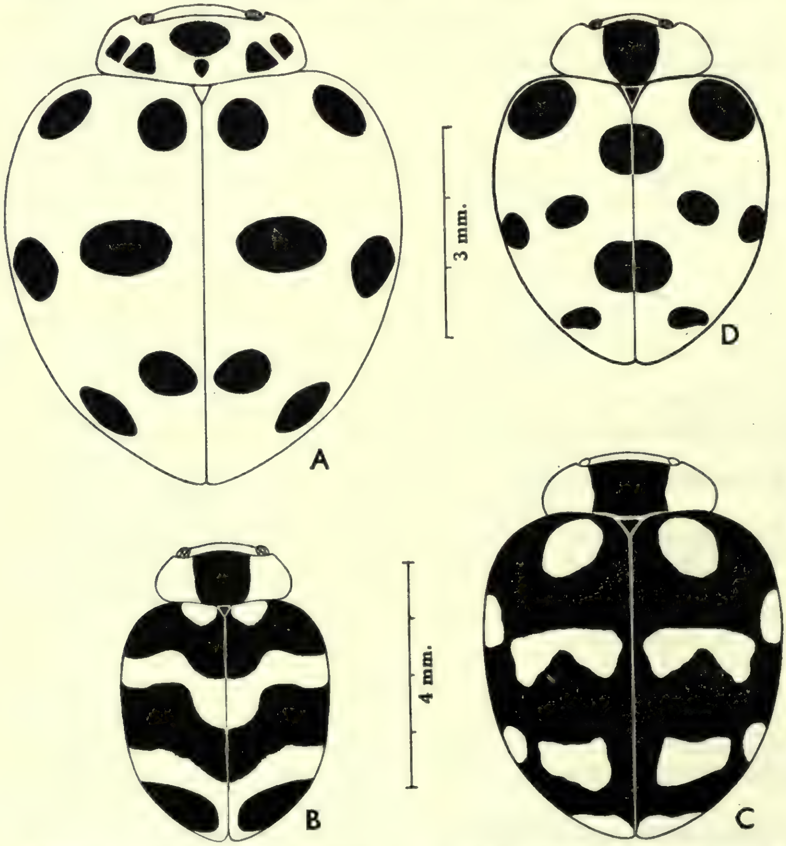

Fig. 1. Outlines showing the patterns : A, *Epilachna indica* Mulsant. B, *Afissa hingstoni*, sp. n. C, *Afissa gibbera* (Crotch). D, *Afissa bengalica* Dieke. (4 mm. scale for figs. A, B, C. 3 mm. scale for fig. D.)

than coloration have to be relied upon and in the case of the present group of species of *Epilachna* the structure of the male and the female genitalia is particularly useful. The type locality of *E. dodecastigma* is Bengal. The species is common in Calcutta where the number of elytral spots is generally 12–14 ; in the northern hilly districts of the State the number of spots is generally more, and often 26–28, on the two elytra. The genitalia and most external characters of the specimen under report agree with the material of the species from Bengal. The species is widely distributed in other countries such as Burma and Indonesia.

Epilachna indica Mulsant
(Text-fig. 1A)

Epilachna indica Mulsant, 1850 : 776–777 [Type loc., India].
Epilachna indica Mulsant ; Kapur, 1961 : 133–140.

Material. 1 ♀, SIKKIM, Gantok, 4,000 ft., 27.vii.1924 (*R. W. G. Hingston*).

The above example is easily recognised as belonging to *E. indica* by the transverse shape of the black discal spot on the elytra and by the outline of the female genital plate which is devoid of a deep notch. The species is widely distributed, having been recorded from several places in north-eastern India, Burma, China, Malaya and Java (*vide* Kapur, 1961).

***Epilachna sikkimica* sp. n.**
(Text-figs. 2A–D)

♀. Body almost similar in appearance to *Epilachna indica* Mulsant but distinctly more obovate (Text-fig. 2, A), with the apical one-third of the lateral margins of elytra broadened ; maximum convexity in the middle of the body. Head reddish-testaceous, eyes grey ; pronotum also reddish-testaceous, with four black to piceous spots, the anterior lateral pair black, oval, fairly large and extending along the entire lateral margin of the pronotum, the posterior pair also black, smaller, roundish and lying close to the basal margin, the discal spot piceous, ill-defined but on the whole elongate and extending from near the anterior margin to the centre of the basal margin. Scutellum black. Elytra with 12 black spots, arranged as 2, 2, 2 on each elytron, and a number of piceous, ill-defined spots in the interspaces, and with none of these touching any of the black spots which may be described as follows : the scutellar spot broadly oval, fairly close to the sutural margin, and commencing from a little distance below the level of the apex of scutellum to about one-fifth of the length of elytron. The shoulder spot larger than the preceding, roundish, close to but not touching the basal and the lateral margins. The discal spot situated at about two-fifths of the length of elytron, roundish but slightly smaller than the preceding spot, equidistant from the sutural margin and the inner margin of the median lateral spot which is also roundish, and sub-equal in size to the discal spot ; the median lateral spot situated at a slightly lower level than the latter and though close, it does not touch the lateral margin. The post-median sutural spot roundish and smallest, at level with the anterior sutural spot. The sixth or the subapical spot situated at about four-fifths of the length, largest, transversely oval, and closer to the lateral than the sutural margin. The piceous spots or areas on the elytra referred to above, as shown by dotted areas in Text-fig. 2, A. Underside with the thoracic sternites, the median parts of abdominal sternites, the greater part of femora (excepting knees) of all the three pairs of legs, piceous ; the elytral epipleura somewhat dark, especially at the narrow external margin which appears almost piceous ; the rest of the underside testaceous. Pubescence greyish throughout on the testaceous surface and the black and piceous areas or spots except on the black elytral spots where it is cinereous.

Head with fine, fairly close, and impressed punctation ; pubescence rather small and fairly close. *Pronotum* transverse, twice as broad as long in the middle, broadly emarginate in the middle anteriorly, the lateral margin moderately rounded ; the anterior and posterior angles rounded ; punctation fine, close and impressed, a little more so than that on the head ; pubescence small, fairly close, subdepressed. *Scutellum* triangular, with the base slightly shorter than the sides ; punctation very fine and rather shallow. *Elytra* distinctly convex, with the anterior angles broadly rounded and the humeral callus visible, the lateral margins narrowly bordered in the basal two-thirds of their length, gradually broadened and rather flat in the apical one-third, the apical angle pointed, rather acute, and slightly upcurved ; punctation double as in the genus, smaller punctures very fine and fairly close and the larger punctures sparse, relatively coarse and shallow ; pubescence as on the pronotum. Female with the last visible abdominal

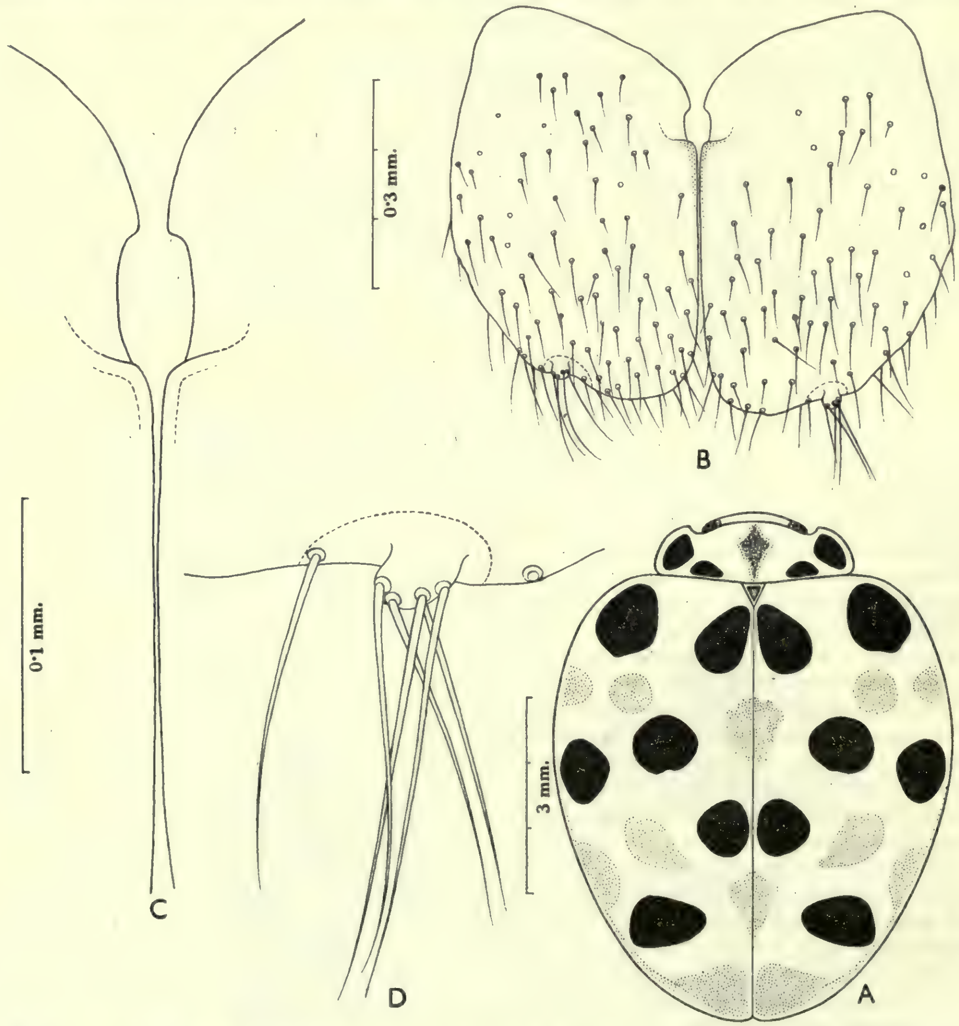

FIG. 2. *Epilachna sikkimica*, sp. n. A, outline showing the pattern. B, female genital plates. C, emargination of genital plates (much enlarged, 0·1 mm. scale). D, stylus of the genital plate (much enlarged, same scale as C).

sternite longitudinally split in the middle, the female genital plates (ix sternite) subquadrate in the basal half and subrounded externally in the distal half (Text-fig. 2, B), straight along the inner margin, with a shallow subquadrate notch near the proximal inner angle, and a small knob-like stylus in the middle of the distal margin ; when magnified, the outline of the notch appears as in Text-fig. 2C and that of the stylus as in Text-fig. 2D.

♂. Unknown.

Length 7·3 mm.; breadth 6·0 mm.

Holotype. ♀, SIKKIM, Dikchu, 2,500 ft., 23.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (Genitalia mounted between two coverslips and attached to specimen.)

This species resembles *E. indica* and *dodecastigma* in general shape, except that it is less orbicular than either of these and has an expanded and rather flattened external margin in the distal one-third of the elytra ; besides, the shoulder-callus in *sikkimica* is quite distinct and the apical angles of the elytra are acute, whereas in the two above-mentioned species these angles are rounded. The outlines of the female genital plates in the three species are distinct ; in *indica* the inner margin near the base is broadly emarginate but the notch as such is absent ; in *dodecastigma*, on the other hand, the notch is well-developed and almost circular in each plate ; in *sikkimica* the notch is subquadrate, as already described.

Afissa bengalica Dieke
(Text-fig. 1D)

Afissa bengalica Dieke, 1947 : 130–131, figs. 85, 154 [Type loc., Kurseong, India].

Material. 1 ♂, SIKKIM, Gantok, 4,000 ft., 6.v.1924 (*R. W. G. Hingston*).

Although described by Dieke from a single ♂ specimen, there is a number of examples of this species in the collection of the Zoological Survey of India, Calcutta (henceforward referred to as " Z.S.I. Collection "), which indicate that it is fairly variable in coloration. The colour-pattern of the example in the collection under report is shown in Text-fig. 1, D. The black, median longitudinal, pronotal spot, extending from the anterior margin to the scutellum, the black scutellum, and the deep and prominent elytral punctures are fairly reliable but the final identification is best done with the help of the male genitalia as described by Dieke (1947 : 131).

Afissa congener (Gorham), **comb. nov.**

Epilachna congener Gorham, 1894 : 693 [Type loc., Burma].
Epilachna (*Solanophila*) *congener* Gorham ; Korschefsky, 1931 : 28.

Material. 1 ♂, SIKKIM, Pedong, 4,000 ft., 27.vii.1924 (*R. W. G. Hingston*).

This species is characterised by the rather orbicular body, a roundish median pronotal spot, ferrugineous scutellum and less coarse elytral punctures. In the Z.S.I. collection it is represented from several parts of north-eastern India, in one case by a long series from Darjeeling district, West Bengal. The tarsal claws in this species being without the basal tooth and the last visible abdominal sternite in the female being entire, it should be placed in the genus *Afissa* Dieke, 1947.

Afissa gibbera (Crotch), **comb. nov.**
(Text-fig. 1C)

Epilachna gibbera Crotch, 1874 : 80 [Type loc., India].
Epilachna (*Solanophila*) *gibbera* Crotch ; Korschefsky, 1931 : 29.

Material. 1 ♀, SIKKIM, Lachen, 8,000 ft., 25.iv.1924 (*R. W. G. Hingston*).

This species is remarkable for its colour-pattern (Text-fig. 1, C) and convexity and is apparently rare in the collections. The colour-pattern is fairly constant but both the pronotal and elytral spots may be testaceous instead of reddish-testaceous as in the type in Crotch's collection. Like the preceding species, it also belongs to the genus *Afissa* Dieke.

Afissa hingstoni **sp. n.**
(Text-fig. 1B)

♀. Body shortly oval (Text-fig. 1, B) and convex. Head reddish-testaceous, excepting the rather dark brown apices of mandibles and greyish eyes. Pronotum reddish-testaceous excepting the median one-third which is black from the base to the apex. Scutellum black. Elytra reddish-testaceous except the three black bands which are roughly basal, median and subapical in position. The basal band extends from shoulder to shoulder except for the two reddish-testaceous sub-triangular spots situated on either side of the scutellum and extending to about the middle of the base of the elytron ; the median one-fourth portion of this band extends as far as one-fourth the length of the suture. The median band extends from one lateral margin of the elytra to the other, is slightly broader than the basal band, and is wavy, being more deeply curved in the median one-fourth of its width. The subapical band is incomplete in the middle, i.e., though it commences from the external margin, it stops short at a little distance before the sutural margin on each elytron. Underside with the prothoracic and elytral epipleura testaceous, the legs reddish-testaceous, and the thoracic and abdominal sternites piceous to black.

Head with rather fine, impressed and sparse punctures and yellowish pubescence ; antennae slightly longer than the width of the head and with the distal three segments forming a serrate club ; eyes moderately granulated. *Pronotum* a little arched and slightly more than twice as broad as long ; widely emarginate anteriorly and moderately rounded anterolaterally ; with the anterior and posterior angles rounded ; the punctation rather fine and impressed like that of the head but less sparse ; pubescence directed anterolaterally. *Scutellum* moderate in size, like an equilateral triangle in outline, and with a few very fine and shallow punctures, and short pubescence. *Elytra* with moderately visible humeral calli, shoulder angles rounded and with very narrowly curved external margin, commencing from near the middle of the base of elytron and ending near the apices which are rounded ; punctation of the mixed type, there being fine, moderately impressed, and close punctures interspersed with coarse, impressed and sparse punctures ; pubescence short, sub-depressed, yellowish on the reddish-testaceous areas, and greyish on the black bands. *Underside* with the epipleura moderately narrow and without any sign of foveae for the reception of the femorotibial joints : prosternum with fine, sparse and impressed punctures, the mesosternum with coarse and close punctures, the metasternum with rather coarse and transversely directed punctures in places : the abdominal lines almost semicircular and extending to about two-thirds the length of the first abdominal segment. *Legs* with the tibiae rather narrow, the claws bifid, the inner denticle being slightly shorter than the outer one. Female with the last visible abdominal sternite entire, the genital plates (ix sternite) elongate and triangular in outline, with a pencil of setae on the small papilla at the apex of each.

♂. Unknown.

Length 4·7 mm.; breadth 3·7 mm.

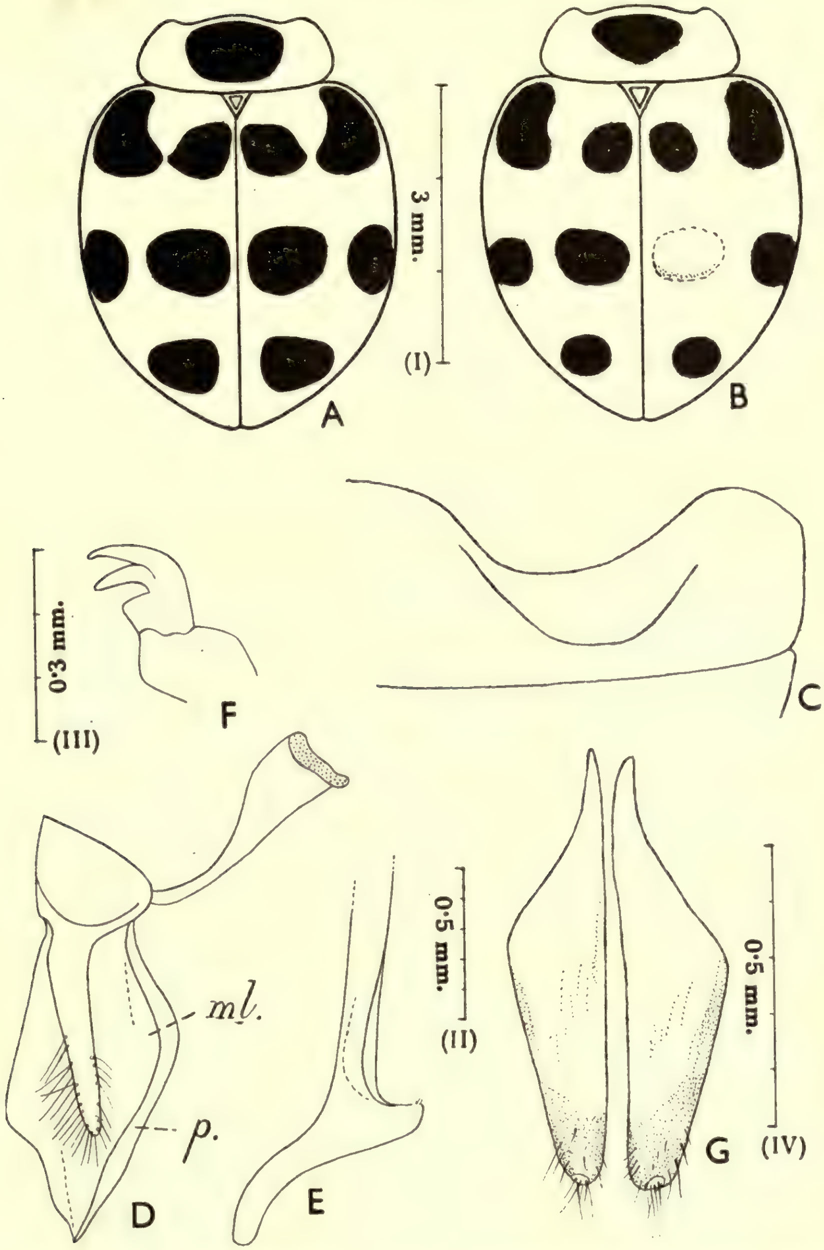

FIG. 3. *Afissula sanscrita* (Crotch). A and B, outlines showing variation in pronotal and elytral patterns. C, part of the first abdominal sternite showing the abdominal line. D, lateral view of the male genitalia except the sipho. E, apex of sipho. F, bifid claw with the basal tooth. G, female genital plates (ix sternite). (I) scale for figs. A and B ; (II) for figs. C, D, E ; (III) for fig. F ; (IV) for fig. G.

Holotype. ♀, TIBET, Rongshar Valley, 10,000 ft., 26.vi.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London.

Paratype. ♀, INDIA, Snooranga, West Almora Division (Kumaon Hills, U.P.) 8,000–12,000 ft., June 1919 (*H. G. Champion*), in Z.S.I. Collection, Calcutta.

Paratype from Snooranga, in the Kumaon Hills agrees in all respects with the holotype except for the small differences in the outline of black bands.

The species comes close to *Afissa nepalensis* Kapur, 1958, in general appearance but can be easily distinguished from the latter by differences in the colour-pattern of the pronotum and the elytra. The pronotum in *A. nepalensis* has the median black marking much narrower and has in addition two black spots situated on either side of it. The black bands on the elytra are joined sublaterally and partly along the suture in *A. nepalensis* but are quite independent of each other in *A. hingstoni*. The pubescence is greyish on the black areas in the latter and black in the former. The elytral punctation is also relatively coarse in the latter.

Afissula sanscrita (Crotch), **comb. nov.**

(Text-figs. 3A–G)

Epilachna sanscrita Crotch, 1874 : 82.
Solanophila sanscrita (Crotch) Mader, 1927 : 45.
Epilachna (*Solanophila*) *sanscrita* Crotch ; Korschefsky, 1931 : 24.

Material. 1 ♀, SIKKIM, Singhik, 3,500 ft., 23.iv.1924 (*R. W. G. Hingston*). 1 ♀, TIBET, Rongshar Valley, 10,000 ft., 26.vi.1924 (*R. W. G. Hingston*).

Our material compares well with the type in Crotch's collection. There are more examples of the species in the B.M. and Z.S.I. collections which show that while the arrangement of spots is constant, there is considerable variation in their size. The colour-pattern of the two examples under report is shown in Text-fig. 3, A and B. The tarsal claw with a basal tooth (F), the bulbous median lobe (*ml*) of the male genitalia (D), and the elongate, filiform female genital plates (G) are some of the characters of the species which show that it belongs to the genus *Afissula* Kapur, 1958.

Afidentula himalayana **sp. n.**

(Text-figs. 4A–B, 5A–J)

♂, ♀. Body shortly oval, rather small, and moderately convex. Head testaceous, eyes dark grey, apices of mandibles dark brown to piceous, pubescence greyish. Pronotum and elytra variable in coloration ; some with testaceous to reddish-testaceous background and black spots (type pattern), others with the black pigmentation increased so much as to leave only small testaceous, irregular areas or spots on the elytra (var. *championi*, see below). The colour pattern of the holotype as follows : A quadrangular black spot in the median half of the pronotum (Text-fig. 4, A), its posterior margin broadly tricuspid. Pubescence greyish on both the testaceous and black areas. Scutellum testaceous. Altogether 7 black spots on each elytron arranged as 2, 2, ½, 2, in addition there is a faint indication of an apical spot. Numbering the spots on the right elytron, from the base to the apex and from the suture to the external margin, the spots are as follows : spot no. 1, large, subrounded, extending from below the level of the apex of scutellum to as far as about one-fourth the length of the elytra, narrowly separated from the suture ; spot 2, subtriangular with the apex close to and at level with the small humeral callus and the base at level with that of spot 1 ; spot 3, discal, a little smaller than the preceding spots, obtriangular (directed towards the apex) ; spot 4, subquadrangular, slightly smaller, situated at level with spot 3, narrowly separated from the external margin ; spot 5, slightly smaller than spot 3, sutural, situated a little below the middle of the suture and forming a circular spot with the opposite spot on the other elytron ; spot 6, smaller, roundish and situated at about three-fourths the length of the elytron and slightly away from the suture ; spot 7 similar, fairly close to the external margin and at level with spot 6. Pubescence greyish on the testaceous areas and piceous on the black spots. Underside with the prosternum, mesosternum and metasternum, the basal four or five abdominal sternites and the coxae black or piceous ; sometimes the anterior one or two pairs of coxae testaceous, the epipleura and the last one or two abdominal sternites testaceous to reddish-testaceous ; legs testaceous, sometimes with the central part of the last pair of femora fuscous.

Head nearly one and a half times as broad as long, with fine, impressed and fairly close punctation ; pubescence also fine, short and fairly close ; antennal sockets clearly away from the eyes, the distance between the sockets distinctly more than that between the socket and the eye ; antennae nearly as long as breadth of the head, with a relatively thickened and compact club ; clypeus relatively narrow ; labrum small, slightly rounded at the base and widely emarginate in front, exposing much of the short, compact mandibles ; each mandible subtriangular, strongly built, with three apical, unserrated teeth (Text-fig. 5, A) ; maxilla characterized by a narrow, subtriangular galea, covered as usual with hair, lacinia also small

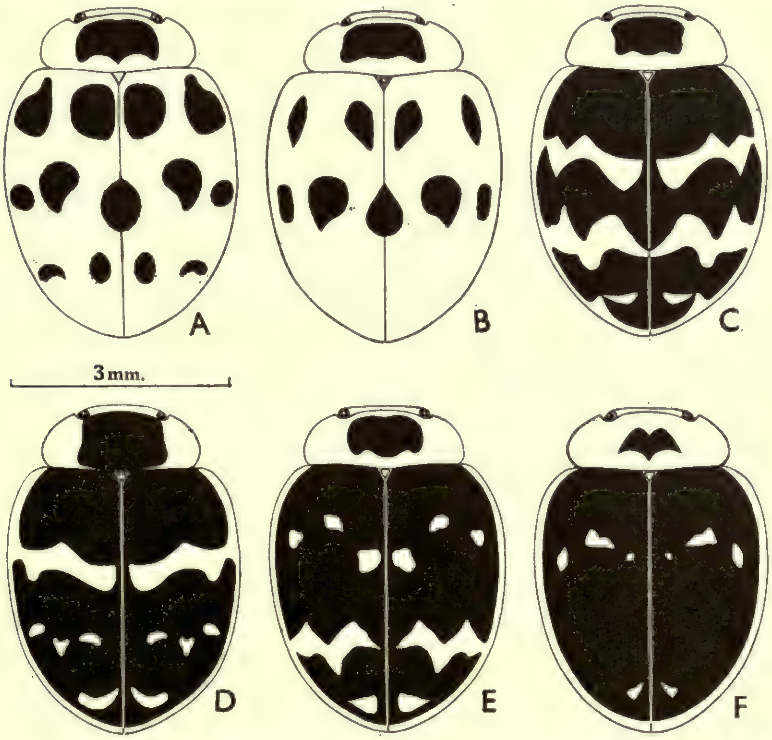

Fig. 4. Outlines showing patterns of *Afidentula himalayana*, sp. n. A, the pattern of the holotype (from Sikkim). B, variation wherein the apical pair of elytral spots is absent (from Darjeeling). C–F, patterns of *A. himalayana* var. *championi*, var. n. (from Kumaon Hills).

but with tufts of relatively long hair. *Pronotum* transverse, a little more than twice as broad as long, broadly emarginate anteriorly, with rounded anterior angles and subrounded lateral margins ; punctations as fine and impressed as on the head, pubescence also similar. *Scutellum* triangular with the sides slightly longer than the base, with very fine and fairly close punctation and pubescence. *Elytra* oblong, twice as long as broad, humeral calli present, the shoulder angles rounded, lateral margins moderately rounded and bordered for about four-fifths of the length, the apical angles rounded ; punctation mixed, the coarse punctures fairly impressed and close, and interspersed rather uniformly among the fine and close punctures ; pubescence very fine, short and fairly close. *Underside* with the prosternum finely and sparsely punctate, and the mesosternum more coarsely and closely punctate ; metasternum more finely punctate, with a distinct median stria and a moderately coriaceous surface ; prosternal and elytral

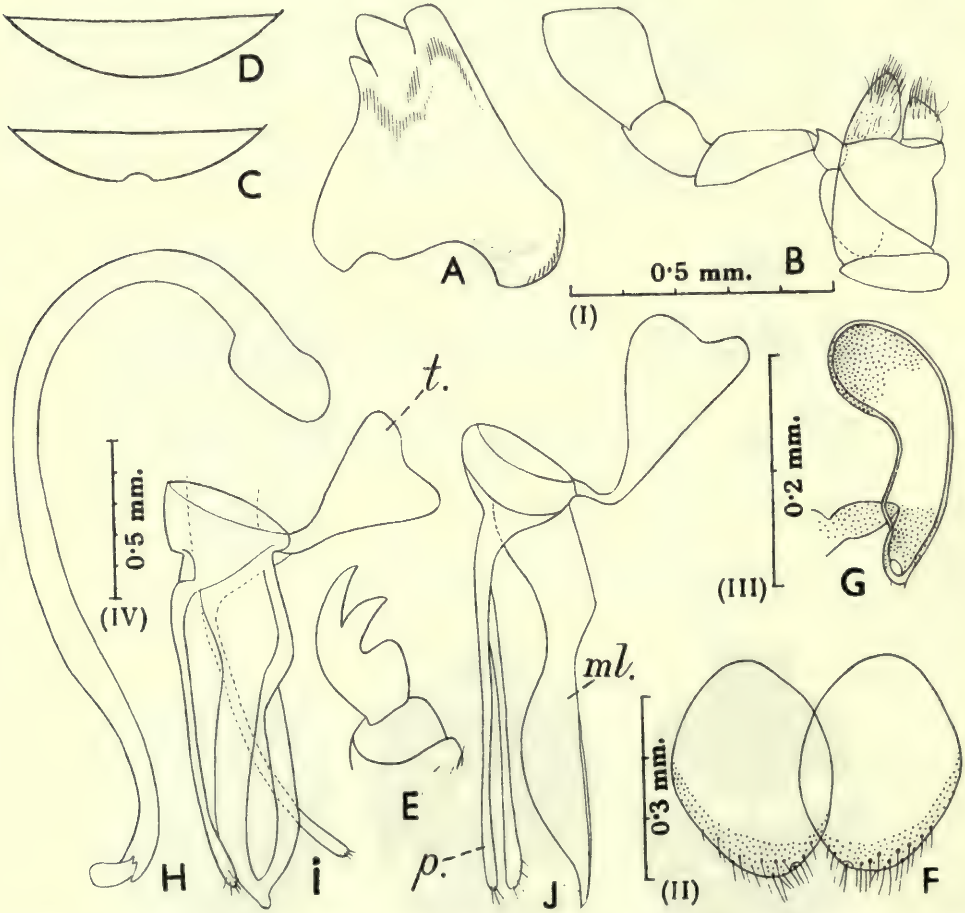

FIG. 5. *Afidentula himalayana*, sp. n. A, mandible. B, maxilla. C, the last visible abdominal sternite in the female. D, the same in the male. E, bifid claw with the basal tooth. F, female genital plates (ix sternite). G, the spermatheca. H, the sipho. I, male genitalia except the sipho, ventro-lateral view. J, the same, lateral view (*ml*, median lobe, *p*, parameres, *t*, trabes). (I) scale for figs. A, B ; (II) for fig. F ; (III) for fig. G ; (IV) for figs. H, I, J.

epipleura without distinct foveae ; claws bifid, each provided with a basal tooth, the inner division of the claw slightly shorter than the outer one, the basal tooth semiquadrate (Text-fig. 5, C) ; abdominal sternites more coarsely punctate than any of the thoracic sternites, but with short and depressed pubescence ; abdominal lines subterminal, complete ; sixth or the last visible abdominal sternite entire, broadly rounded apically in the female (Text-fig. 5, D), and rounded, with a small apical notch in the male (Text-fig. 5, E). *Female genitalia* with the genital plates subcircular, slightly longer than wide, provided with short, rather sparse hair towards the apical margin (Text-fig. 5, F) ; spermatheca nearly sausage-shaped, slightly narrowed proximally (Text-fig. 5, G). *Male genitalia* relatively well-developed, sipho more or less sigmoid (Text-fig. 5, H), basal piece relatively short, trabes well-developed, broad, spathulate distally, parameres as long as the median lobe, but narrow and with a few short hairs at the apex, the median lobe about four times as long as broad, slightly bent at the basal one-third, concave in the distal two-thirds, and narrowed subapically to a fine pointed apex (Text-fig. 5, H) viewed from the side, it gives the appearance of a spoon (Text-fig. 5, J).

Length ♂, 4·3–5·1 mm., ♀, 5·0–5·3 mm.; breadth ♂, 3·0–3·8 mm., ♀, 3·5–4·0 mm.

Holotype. ♀, SIKKIM, Tsuntang, 7,000 ft., 25.iv.1924 (*R. W. G. Hingston*) ; in the British Museum (N.H.), London. (Female genitalia and abdominal sternites mounted between two coverslips on a card and on the same pin as the specimen.)

Allotype. ♂, INDIA, Darjeeling, 7,000 ft., 9.viii.1924 (*R. W. G. Hingston*) ; in the B.M. (N.H.) ; with spots smaller but the same number as the holotype.

Paratypes. 10 examples : 1 ♀, SIKKIM, Lachen, 8,000 ft., 25.iv.1924 (*R. W. G. Hingston*) ; pattern more or less like the holotype ; mouth-parts, front legs, abdominal sternites and female genitalia mounted on slide ; in the Z.S.I. collection. The remainder of the nine examples are not from the Expedition's material but with one exception belong to Z.S.I. 1 ♀, SIKKIM, Gopaldhara, Rungbong Valley, 1916 (*H. Stevens*), in the B.M.(N.H.), black elytral spots well-developed with a tendency for spots 6 and 7 to be connected by a thin, subtransverse line. 1 ♂, 1 ♀, Lachen Valley (no further data), the genitalia mounted between two cover-slips, on a card and pinned along with the specimen ; spot 7 missing, otherwise the pattern similar to that of the holotype. 2 ♀ near Darjeeling, 7,000–8,000 ft., —.v.1910 (*R. B. Horsfak*), elytral spots 1 to 5 generally reduced, in one example spot 6 very much reduced and faint and 7 absent, in the other example spot 6 missing and 7 very small and faint. 1 ♂ SIKKIM, Zema, *ca.* 2,697 m., 26.v.1959, genitalia mounted as above. 2 ♀ SIKKIM, Lachen, *ca.* 2,706 m., 19–20.v.1959, genitalia mounted. 1 ♀ SIKKIM, Sha Chu, *ca.* 2,879 m., 16.v.1959 (all *A. G. K. Menon*).

The characteristic structure of the mouth-parts, the presence of a quadrate basal tooth on the bifid tarsal claws and the structure of the male and female genitalia in the species, are characteristic of the genus *Afidentula* Kapur, 1958. *A. himalayana* is distinguishable from *Afidentula manderstjernae* (Mulsant) (3·4 mm. long) and *Afidentula minima* (Gorham) (3·0 mm.), the other two species of the genus, by its slightly larger size, and the different colour-pattern, although the post-median sutural spot appears to be a common feature of the three species. In *A. manderstjernae*, the pronotal spot is generally absent or more diffused, while the two subapical elytral spots are usually united into one subquadrate spot, in contrast to the two usually separate spots in *A. himalayana*. In *A. minima*, on the other hand, the pronotal spot is absent and the external elytral margin bordered with black. All three species are further distinguishable by the structure of the male genitalia which is different for each species.

Afidentula himalayana var. ***championi*** **var. n.**

(Text-figs. 4C–F)

There are 33 examples, all from the Kumaon Hills, Uttar Pradesh, apparently collected on two different occasions by Mr. H. G. Champion, in which the black elytral spots are enlarged and confluent in various manners. Some of the elytral patterns are illustrated in Text-fig. 4, C–F. Generally, spots 1 and 2 join to form a broad basal band ; spots 3, 4 and 5 also join to form a transverse median band ; spots 6 and 7 are also enlarged and confluent so as to form a transverse sub-apical band (Text-fig. 4, C) ; sometimes the median and sub-apical bands are connected at various points so as to leave only a few, irregularly demarcated, testaceous areas in between the two bands (D), likewise the basal and the median band may also join one another in places (E) ; in some rare instances all the three bands are connected so as to leave only a few, irregular, testaceous spots near the sub-basal and sub-apical areas. The pronotal spot, on the other hand, increases or decreases slightly, independently of the increased pigmentation of elytra, as is evident from the outline of patterns given in Text-fig. 4, C–F. All these examples are being named as variety *championi* for convenience of reference.

It may, however, be noted that all the typical examples of the species detailed above come from the eastern Himalaya, while all the examples of the variety *championi* before me are from the Kumaon Hills, i.e., more from the western Himalaya. The material under study would strongly suggest that the variety *championi* may deserve the rank of a subspecies. However, as very little collecting has been done in the intervening parts of the Himalaya, it is probable that both the typical form as well as the variety mentioned above, may in reality be more widely distributed.

Material. Total 33 examples as follows :—12 examples, INDIA, West Almora, Kumaon Hills, U.P. (*H. G. Champion*) (no further data available), (8 exs. in B.M. (N.H.) and 4 in Z.S.I.) ; 21 examples, Pindar Valley, 8,000–11,000 ft., Kumaon Hills (*H. G. Champion*) (16 in B.M (N.H.) and 5 in Z.S.I.) ; ♂ and ♀ genitalia of some examples from both the series mounted between two coverslips and pinned with the specimens.

Subfamily **COCCINELLINAE**

Tribe **Coccidulini**

SINGHIKALIA **gen. n.**

Type species : *Singhikalia ornata* Kapur sp. n.

Body large, subcircular, moderately convex, with fine, fairly close and subdepressed pubescence, and fine and impressed punctation except on the elytra where coarse punctures are interspersed among very fine punctures ; eyes rather coarsely granulated ; antennae 11-segmented, fairly long, reaching the middle of the lateral margin of pronotum, the apical three segments forming a fairly compact club ; labrum transverse, almost covering the mandibles which are bifid at the apex and provided, like the other carnivorous species, with a basal tooth each ; pronotum transverse (5 : 9), broad at the base, moderately rounded laterally, distinctly narrowed and emarginate anteriorly, with acute anterior angles ; elytra with a distinct humeral callus, lateral margins moderately reflexed or bordered in the basal three-fourths of the length, the pronotal epipleura at the anterior angles and the elytral epipleura for the most part of their length subdepressed, without foveae for reception of the knees ; prosternum widely but shallowly emarginate in front, with two subparallel carinae which do not reach the anterior margin ; metasternum with a longitudinally median stria running throughout its length ; abdominal lines short, incomplete, with the distal part oblique and faint.

This genus may be placed in the tribe Coccidulini on account of its relatively coarse eyes, long antennae, mixed type of elytral punctation, etc., and may come close to the genus *Oridia* Gorham, described from Burma, on account of its large size. It is, however, easily distinguishable from the latter and other genera of the tribe Coccidulini by several characters which may necessitate the naming of a new tribe for the genus. For example, it can be distinguished from *Oridia* as well as *Rhizobius* Stephens, *Aulis* Mulsant and *Sumnius* Weise, several species of which occur in India and neighbouring countries, by the fine, rather close, and short pubescence, the narrow anterior angles of pronotum, relatively less coarse eyes, and by the reflexed external margins of the elytra. Superficially it may resemble certain Noviini but can be easily recognised by the 11-segmented antennae instead of the 8-segmented ones in Noviini and also by several other characters, such as the shape and structure of the pronotum and prosternum. Eyes are more coarsely granulate than is the case either in the Noviini or the Scymnini or the Ortaliini. Besides, the Scymnini are generally small and do not usually possess mixed (or double) type of elytral punctation. The latter is also true of Ortaliini which are further characterized by the presence of a prominent canthus in the eye and by the slender antennae.

Singhikalia ornata sp. n.

(Text-figs. 6A–D, 7A–H)

♂, ♀. Head reddish-testaceous except for the black eyes, the pronotum also reddish-testaceous, with a pair of large sub-basal spots as shown in Text-fig. 6, A ; the black spot does not reach the anterior angle and the lateral margin ; scutellum reddish-testaceous ; elytra also reddish testaceous with a total of 14 black spots of variable size, arranged as 2, 2, 2, 1, and a narrow black border along the basal half of the external margins of the elytra ; the elytral spots (Text-fig. 6, A) may be described as follows : the scutellar spot is elongate-oval, begins from the base of the elytron close to the base of the scutellum, and extends along the scutellar margin for a short distance of 1 mm.; the shoulder spot appears to be a compound spot (formed as if by the confluence of an outer, smaller, rounded spot with an inner, larger, and oval spot), extending to about one-fourth the length of elytron and touching the black external border of the elytron just below the level of the humeral callus ; in one of the three examples, this spot is much reduced in size and broken into two ; the discal spot is roundish, moderately large, situated above the transverse median line of the elytra and close to the suture, not touching the latter in two examples but pointed posteriorly and touching the suture in one example ; the median lateral spot largest, transverse, almost level with the discal spot and confluent with the black, elytral border ; the two post-median spots roundish, smaller than the discal spot, the inner one a little more distant from the suture than the discal spot, the outer one slightly larger than the inner spot and touching the external margin ; the subapical spot almost equal to the external, post-median spot, mostly rounded, free of the lateral and

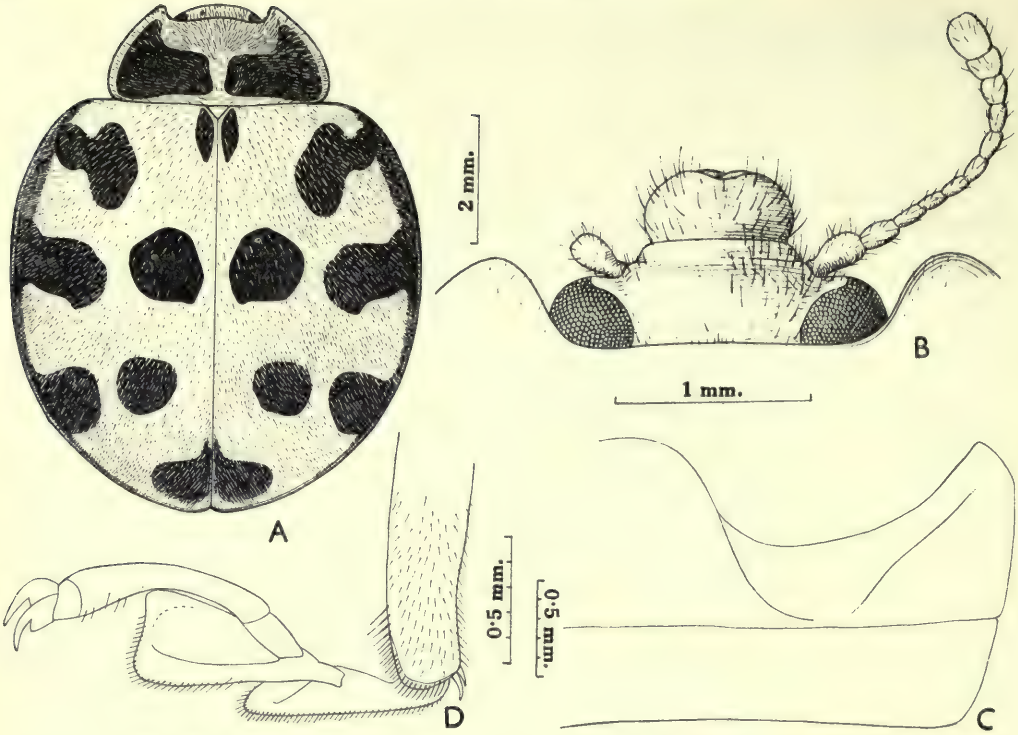

FIG. 6. *Singhikalia ornata*, gen. et. sp. n. A, outline showing the pattern. B, front view of the head. C, part of first two abdominal sternites showing the abdominal line. D, apex of tibia, the tarsi and claws.

apical margins though abutting upon the sutural margin where it is drawn out for a short distance. Underside testaceous to reddish-testaceous, except for the dark, piceous to black, posterior parts of the prosternum and mesosternum, the metasternum and most of the median part of the abdominal sternites ; the legs and epipleura are also testaceous except for a few small piceous touches, here and there, on the coxae, femora and tibiae.

Head nearly as long as broad (Text-fig. 6, B), eyes moderately coarsely facetted, antennae arising a little in front of rather than between the eyes, 11-segmented, the last three segments forming a fairly compact club (Text-figs. 6, B ; 7, A), the penultimate segment rather transverse, the apical one a little longer than broad, slightly obliquely truncated apically ; labrum (Text-fig. 7, B) transverse, subquadrate, nearly twice as wide as long, mandibles (Text-fig. 7, C) bifid at the apex, each provided with a basal tooth, maxillary palpi with the last segment securiform, nearly as long as the preceding two segments together (Text-fig. 7, D), labium (Text-fig. 7, E) moderately wide anteriorly ; the frons and clypeus with fine, fairly close and impressed punctation, and moderately long, rather sparse, and light brown pubescence. *Pronotum* transverse in outline as described for the genus, punctation fine, close, and impressed except for the slightly coarser punctures near the anterior angles, pubescence fine, short to moderately long, close, depressed, directed anterolaterally and light brown in colour ; very narrowly margined laterally and along the anterior angles, plain for most of the anterior and basal margins. *Scutellum* triangular, with the base as wide as the sides, very finely punctate and with a few delicate, short hairs. *Elytra* with the maximum convexity before the middle, the humeral calli well-defined, shoulder-angles rounded, lateral margins rebordered, expanded laterally in the basal two-thirds, more so in the basal one-third of the length of elytra, apical angles rounded, the punctation double, the fine punctures close and impressed, the coarse punctures also impressed, interspersed among the fine punctures, pubescence similar to that on the pronotum but a little shorter. *Underside* with short, depressed pubescence and fine punctation, the prosternum widely and shallowly emarginate in front, not covering the mouth-parts, with a pair of parallel carinae which stop short of the anterior margin ; mesosternum widely emarginate in front, narrow and transverse at the base ; metasternum with a median, longitudinal stria extending from the anterior to the basal margin, the disc otherwise flat, with a number of sparse, coarse and impressed punctures ; the posterior pair of coxae more widely spaced than either of the anterior pairs, legs comparatively slender, the claws simple, each with a subquadrate basal-tooth (Text-fig. 6, D) ; five abdominal sternites visible, abdominal lines incomplete (Text-fig. 6, C), reaching the apical margin of the first segment and running along it for a short distance, a faint oblique line directed towards the antero lateral angle also visible (in examples where abdomen has been treated with KOH, it vanishes), but apparently unconnected with distal part of the abdominal line. *Male genitalia* with the basal piece of moderate size, the median lobe like a gradually narrowed tube with rounded apex, parameres narrow, subequal in length to the median lobe, rounded at the apex, with moderately long and fairly close setae on the

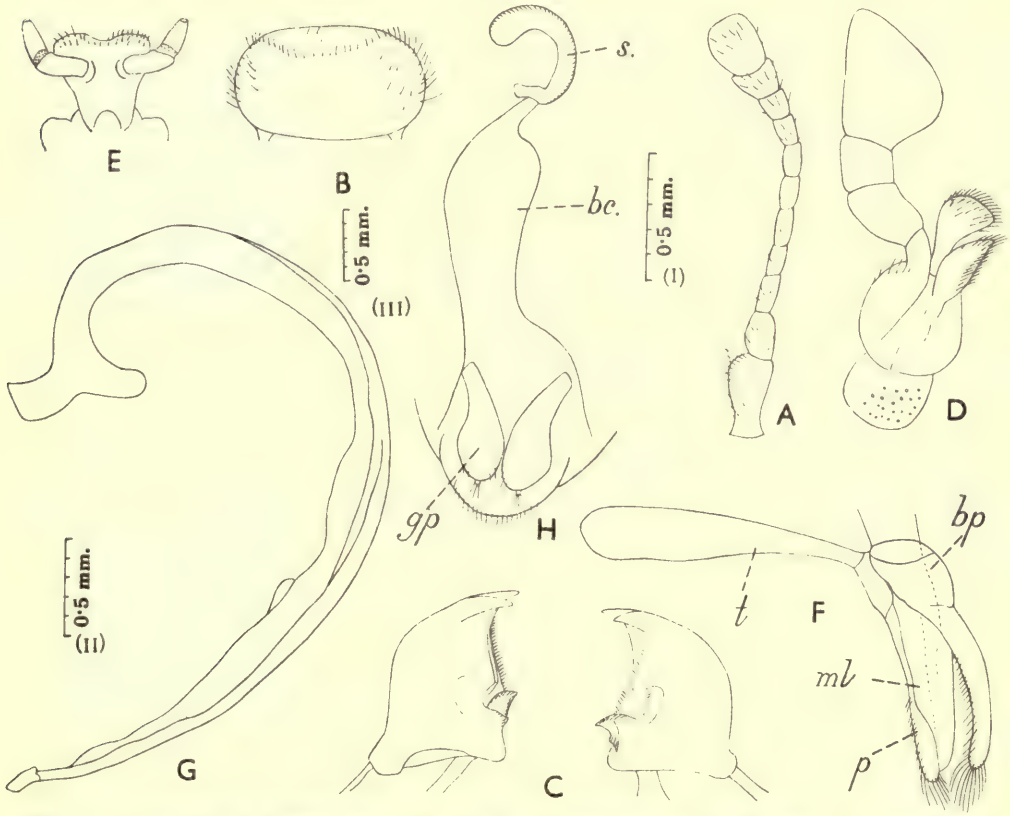

FIG. 7. *Singhikalia ornata*, gen. et. sp. n. A, antenna. B, labrum. C, mandibles. D, maxilla. E, labium. F, male genitalia except the sipho (*bp*, basal plate ; *ml*, median lobe ; *p*, parameres ; *t*, trabes). G, the sipho. H, parts of female genitalia (*s*, spermatheca ; *bc*, bursa copulatrix ; *gp*, genital plates). (I) scale for figs. A–E ; (II) for figs. F, G ; (III) for fig. H.

surface facing the median lobe, trabes (*t*) a little longer than the median lobe and basal piece combined, gradually expanded distally and rounded at the apex, the sipho evenly curved proximally, less so and narrowed distally, rather weakly chitinised on the inner side, the siphonal capsule with the inner arm narrower than the outer one (Text-fig. 7, F). *Female genitalia* with the pair of genital plates (*gp*) elongate (Text-fig. 7, H), narrower at the base, gradually expanded and rounded towards the apex and each provided with a knob-like stylus bearing three to four long setae, the apical margin of the plates also provided with a number of shorter setae, bursa copulatrix (*bc*) large and tubular ; the spermatheca (*s*) like a blind, gradually expanded tube which is curved to form about three-quarters of a circle.

Length 7·5–7·8 mm.; breadth 6·3–6·5 mm.

Holotype. ♂, SIKKIM, Singhik, 3,500 ft., 23.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (Genitalia dissected and mounted between two coverslips and attached to the same pin as the specimen.)

Allotype. ♀, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*) ; also in the British Museum (N.H.), London. (♀ genitalia mounted as above.)

Paratype. 1 ex., same data as the allotype, in the Z.S.I. collection, Calcutta.

In the remarks following the description of the genus, the important characters of the species have been compared with those of *Oridia pubescens* Gorham, from Burma. It may be further stated that *S. ornata* has black spots on the reddish testaceous background of the pronotum and elytra, whereas *O. pubescens* is without any ornamentation or colour-pattern.

Tribe **Noviini**

Rodolia guerini (Crotch)

Vedalia guerini Crotch, 1874 : 282 [Type loc., Pondicherry, India].
Rodolia guerini (Crotch) ; Korschefsky, 1931 : 101.
Rodolia guerini (Crotch) ; Kapur, 1949 : 535.

Material. 1 ♀, SIKKIM, Singhik, 3,500 ft., 23.iv.1924 (*R. W. G. Hingston*).

In the above example the pair of basal spots join each other to form a bundle-shaped transverse band. In every other respect the example agrees with other material of the species from various parts of India.

Tribe **Scymnini**

Pullus bourdilloni Kapur

Pullus bourdilloni Kapur, 1958 : 335–338, fig. 12 [Type loc., Nepal].

Material. 5 examples, SIKKIM, Singhik, 3,500 ft., 23–24.iv.1924 (*R. W. G. Hingston*).

In all the five examples (3 females, 2 males) the elytra are black with testaceous apices as described for pattern No. 3 of this species (*vide* Kapur, 1958 : 337, fig. 12 C). In respect of other external characters and the structure of genitalia, the material under report agrees with the earlier description.

Pullus testacecollis sp. n.

(Text-figs. 8A–C)

♂. Body oblong-oval, convex, pubescence greyish throughout. Head testaceous with the apices of mandibles darker and the eyes black. Thorax also testaceous, lighter anteriorly and showing clearly part of the black eyes. Scutellum testaceous. Elytra black except the apical one-fourth which is testaceous, widely emarginate at the base (Text-fig. 8, A). Underside testaceous excepting the piceous to black mesosternum, the black metasternum and elytral epipleurae and the testaceous legs.

Head with fine and rather sparse punctation, and fine, short and sparse pubescence. *Pronotum* transverse, nearly twice as wide as long in the middle, slightly emarginate in front and narrowed anteriorly, anterior angles slightly acute, posterior angles a little rounded ; with fine, impressed and rather sparse punctation and short, sparse and suberect pubescence. *Scutellum* with a few fine punctures and short hairs. *Elytra* rather elongate-oval gradually

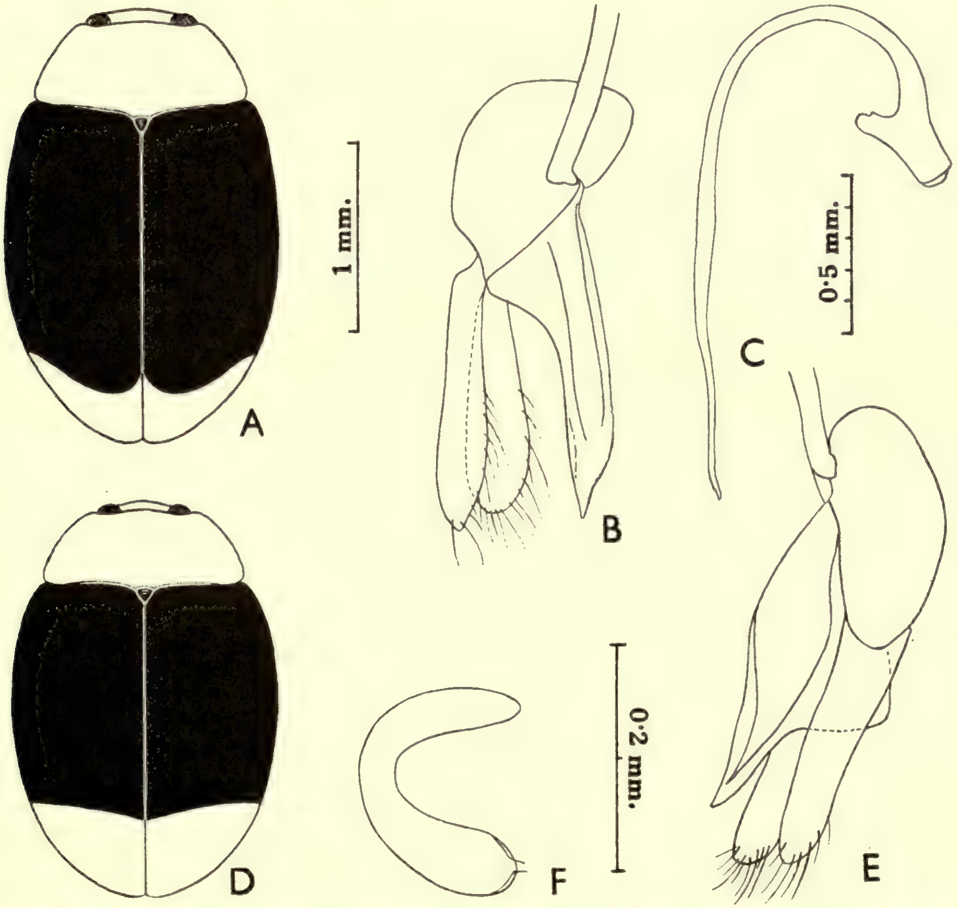

FIG. 8 A, outlines of *Pullus testacecollis*, sp. n. B, male genitalia of the same except the sipho. C, the sipho. D, outline of *Pullus hingstoni*, sp. n. E, male genitalia of the same except the sipho. F, spermatheca, also of the same. (1·0 mm. scale for figs. A, D ; 0·2 mm. scale for figs. B, E, F ; 0·5 mm. scale for fig. C.)

narrowed in the apical one-fifth of the length, moderately convex, shoulder-angles a little obtuse, humeral calli present, apical angle rounded, punctation mostly fine, very slightly coarser than that on the pronotum, more impressed and closer ; pubescence similar to that on the pronotum. *Underside* with the prosternal carinae parallel except near the anterior margin where they meet in a narrow arch ; the space between the carinae finely punctured ; meso- and metasternum with relatively coarse, impressed and fairly close punctures. *Male genitalia* (Text-fig. 8 B, C) with the basal piece broad, median lobe broad at the base but narrow and tubular from the middle to the pointed apex ; the parameres spathulate, nearly as long as the median lobe ; the sipho long and tapering at the apex, curved proximally for one-third of the length, the inner arm of the siphonal capsule short, narrow and with a small notch.

♀. Unknown.

Length 2·2 mm.; breadth 1·5 mm.

Holotype. ♂, SIKKIM, Tsuntang, 6,000 ft., 24.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London.

The species comes close to *Pullus pallidicollis* (Mulsant) which is known from various parts of Asia including Burma. *P. pallidicollis* is, however, more rounded and convex and slightly smaller than *P. testacecollis*. The pubescence in the former is coarser than in the latter ; in respect of coloration of the elytra also, the two species are easily distinguishable ; in *pallidicollis* the testaceous area of the two elytra together gives a semilunar appearance, whereas in *testacecollis* each testaceous apical part is broadly curved at the base. From other species like *Pullus apiciflavus* (Mots.) and *Pullus pyrochellus* (Mulsant), *P. testacecollis* is easily distinguishable by the absence of a piceous or black semicircular marking on the pronotum, these being present in the other two species.

Pullus hingstoni sp. n.

(Text-figs. 8D–F)

♂, ♀. Similar in outline to *Pullus testacecollis* Kapur but less elongate (Text-fig. 8, D) ; with the scutellum black, head, pronotum and the apical one-third of the elytra reddish-testaceous, the line formed at the meeting place of the black and the reddish-testaceous parts of the two elytra together, almost straight to widely rounded (Text-fig. 8, D).

Head with fine, rather sparse and impressed punctation, and short and sparse pubescence. *Pronotum* similar to that of *P. testacecollis* except for the slightly more impressed and coarse punctation and relatively longer pubescence. *Elytra* with coarse, less impressed and shallower punctation than that in *P. testacecollis* ; pubescence also relatively long, coarse and sparse when compared with that in the latter. *Underside* with the prosternal carinae almost straight, slightly convergent, but each meeting the anterior margin independently ; the meso- and metasternum mostly with coarse and impressed punctures, and relatively long and subdepressed pubescence ; the last abdominal segment broadly emarginate apically in the male, and rounded in the female. *Male genitalia* (Text-fig. 8, E) characterized by a short median lobe which is broad in the basal half and with a prominent keel, narrowed at the apical half and with pointed apex, parameres longer than the median lobe, narrow, rounded at the apex, and with a few setae. *Female genitalia* with the ovipositor elongate and slightly narrowed apically ; spermatheca semicircular (Text-fig. 8, F), slightly tapering towards the distal end.

Length, 2·0 mm. ; breadth 1·4 mm.

Holotype. ♂, SIKKIM, Tsuntang, 6,000 ft., 25.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London.

Allotype. ♀, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London.

This species is fairly closely related to *Pullus testacecollis* Kapur described earlier, from which it may be distinguished by the differences in the shape of the body, the elytral colour-pattern, the punctation and pubescence and the structure of the male genitalia, as described above. The female example, though from Singhik (5,000 ft.) in the State of Sikkim, apparently belongs to this species as it is very similar in shape, colour-pattern, punctation pubescence, etc., to the holotype from the neighbouring Tsuntang (6,000 ft.).

***Pullus* sp.**

Material. 1 ♀, SIKKIM, Lachen, 8,500 ft., 25.iv.1924 (*R. W. G. Hingston*).

This example (length 2·45 mm., breadth 1·45 mm.) is more oblong than either *Pullus testacecollis* Kapur or *Pullus hingstoni* Kapur. The elytral colour-pattern is like that of the latter but the pronotum, instead of being uniformly testaceous as in the above two species, has a semicircular black area across the middle one-third of the base. Scutellum black ; the female genitalia with the spermatheca rather semicircular, a little wider proximally and slightly constricted in the middle.

Scymnini of the Himalaya are very inadequately known and as the species are often not easily separated without the employment of male genital characters, it is considered best not to name this species without further material being available.

Tribe **Aspidimerini**

Cryptogonus postmedialis Kapur

Cryptogonus postmedialis Kapur, 1948 : 95–97, fig. 6 [Type loc., Ranikhet, Kumaon Hills].

Material. 6 ♂, 5 ♀, SIKKIM, Singhik, 3,500–5,000 ft., 23–24.iv.1924 (*R. W. G. Hingston*).

This species is closely related to *Cryptogonus orbiculus* (Gyllenhal) but is distributed in the Himalaya from Kumaon Hills to Darjeeling in India and Mishmi Hills in Burma (*vide* Kapur, 1948 : 96).

Cryptogonus quadriguttatus (Weise)

Aspidiphorus quadriguttatus Weise, 1895a : 326 [Type loc., Sikkim].
Cryptogonus quadriguttatus (Weise) Weise, 1900 : 428.
Cryptogonus quadriguttatus (Weise) ; Kapur, 1948 : 97–99, fig. 7.

Material. 4 ex., INDIA, Kalimpong, 4,000 ft., 27.iii.1924 (*R. W. G. Hingston*).

This species is also distributed from the Kumaon Hills in Uttar Pradesh, to the Naga Hills and Patkai Mountains in Assam. The four examples mentioned above are uniform in coloration although the species shows considerable variation in colour-pattern.

Cryptogonus ariasi (Mulsant)

Aspidimerus ariasi Mulsant, 1853 : 265 [Type loc., North India].
Cryptogonus ariasi (Mulsant) Kapur, 1948 : 102–103, fig. 9B, D, E.

Material. 1 ♂, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*).

This species is also distributed from the Kumaon Hills in Uttar Pradesh to Lebong, 5,000 ft., in Burma (*vide* Kapur, 1948 : 102–3).

Cryptogonus hingstoni Kapur

Cryptogonus hingstoni Kapur, 1948 : 103–104, fig. 9A, F [Type loc., Sikkim, Singhik].

Material. 4 ex., SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*).

This species is closely related to the preceding species, though it is easily distinguishable from it by the coloration and other morphological characters.

Cryptogonus himalayensis Kapur

Cryptogonus himalayensis Kapur, 1948 : 108–109, fig. 11 [Type loc., Ruby Mines, Burma].

Material. 1 ♀, SIKKIM, Singhik, 3,500 ft., 23.iv.1924 (*R. W. G. Hingston*).

This species belongs to the *fulvoterminatus* group of four species (Kapur, 1948 : 105) which so far as known mostly occur in Burma.

Cryptogonus complexus Kapur

Cryptogonus complexus Kapur, 1948 : 110–111, fig. 12 [Type loc., Patkai Mountains, Assam].

Material. 1 ex., SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*).

Besides Assam and Sikkim, this beautiful species is found in Burma's Mishmi Hills.

Tribe **Chilocorini**

Chilocorus hauseri Weise

Chilocorus hauseri Weise, 1895c : 135 [Type loc., Sikkim].
Chilocorus hauseri Weise ; Sicard, 1913 : 500.

Material. 1 ♂, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*).

The example from the type locality agrees with the original description given by Weise. Sicard (*loc. cit.*) further recorded it from Burma and Tali (Yunan).

Chilocorus braeti Weise

Chilocorus braeti Weise, 1895b : 154 [Type loc., Kurseong, N. Bengal].

Material. 1 ♂, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*). 1 ♀, INDIA, Darjeeling, 7,000 ft., 1–14.vi.1924 (*Miss Wetherall*). Two further examples (♂, ♀) from Darjeeling district are in the Z.S.I. collection.

This species is characterized by the typically cordate outline and shining black coloration dorsally, the finely punctured elytral disc and the coarsely punctured areas along the lateral margin. The size of the species varies from 4·2 mm. to 5·5 mm.

Tribe **Synonychini**

Leis dimidiata (Fabricius)

Coccinella dimidiata Fabricius, 1781 : 94 [Type loc., Coromandel].
Leis dimidiata (Fabricius) Mulsant, 1850 : 242.
Leis dimidiata (Fabricius) ; Korschefsky, 1932 : 273–274.
Leis dimidiata (Fabricius) ; Kapur, 1958 : 329.

Material. 1 ♂, SIKKIM, Pedong, 4,000 ft., 29.vii.1924 (*R. W. G. Hingston*).

This species is extremely variable in colour-pattern, there being some 15 aberrations already recorded. The example mentioned above, however, represents the typical pattern of the species.

The species is widely distributed in northern India, especially in the Himalayas, and in China and Japan although its recorded type locality remains " Coromandel "!

Aiolocaria hexaspilota (Hope)
(Text-fig. 9B)

Coccinella 6-spilota Hope, *in* Gray, 1831 : 31 [Type loc., Nepal].
Aiolocaria hexaspilota (Hope) Crotch, 1874 : 178.
Aiolocaria hexaspilota (Hope) ; Korschefsky, 1932 : 277.
Aiolocaria hexaspilota (Hope) ; Kapur, 1958 : 311.

Material. 2 ex., SIKKIM, Singhik, 3,500–4,000 ft., 23.iv.1924 (*R. W. G. Hingston*).

Originally recorded from Nepal, this species appears to be widespread in the Himalayas and has already been recorded from Kashmir, Sikkim and northern Burma (*vide* Kapur, 1958 : 311). Colour-pattern of the species is variable, that of the examples referred to above is shown in Text-fig. 9, B.

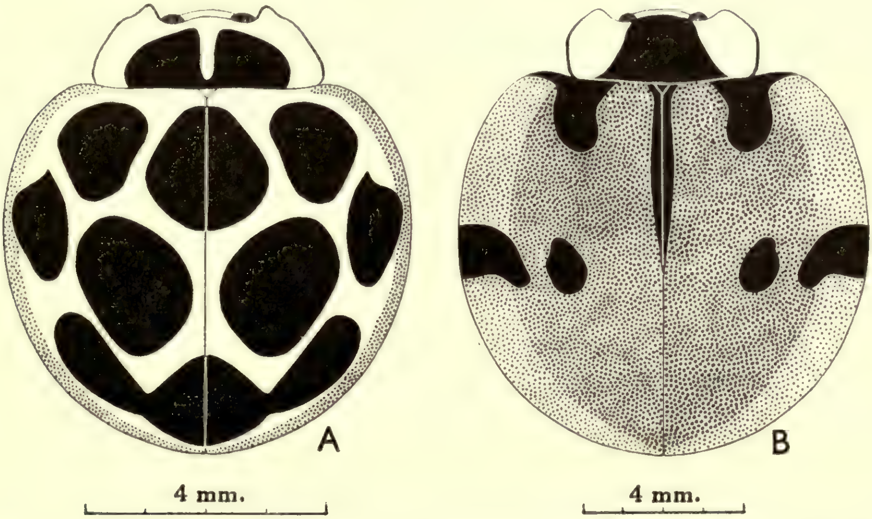

FIG. 9. Outlines showing the patterns. A, *Aiolocaria dodecaspilota* (Hope). B, *Aiolocaria hexaspilota* (Hope).

Aiolocaria dodecaspilota (Hope)
(Text-fig. 9A)

Coccinella 12-spilota Hope, *in* Gray, 1831 : 31 [Type loc., Nepal].
Aiolocaria dodecaspilota (Hope) Crotch, 1874 : 178.
Aiolocaria dodecaspilota (Hope) ; Korschefsky, 1932 : 278.
Palaeoneda dodecaspilota (Hope) Mader, 1933 : 93.

Material. 1 ♀, SIKKIM, Singhik, 3,500 ft., 23.iv.1954 (*R. W. G. Hingston*).

Mader (1933 : 93) transferred this species to the genus *Palaeoneda* Crotch but I do not believe that such a transfer is justified because a comparison of *dodecaspilota* and *Palaeoneda miniata* (Hope), the type species of *Palaeoneda*, do not show these to be congeneric ; *dodecaspilota* lacks most of the characters by which *Palaeoneda* is defined.

Already known from Nepal and Burma, the occurrence of this species in Sikkim is not surprising.

Ballia gustavi Mulsant

Ballia gustavi Mulsant, 1853 : 165 [Type loc., N. India, Himalaya].
Ballia gustavi Mulsant ; Kapur, 1958 : 329.

Material. 1 ♀, SIKKIM, Singhik, 3,500 ft., 23.iv.1924 (*R. W. G. Hingston*).

As stated earlier (Kapur, 1958 : 329) this species is only provisionally recognised as distinct, and may in fact be a mere variety. The colour-pattern of our example agrees with the typical description of *gustavi*.

Oenopia luteopustulata Mulsant

Oenopia luteopustulata Mulsant, 1850 : 421 [Type loc., Assam].
Coelophora luteopustulata (Mulsant) Crotch, 1874 : 156.
Oenopia luteopustulata Mulsant ; Korschefsky, 1932 : 288.
Oenopia luteopustulata Mulsant ; Kapur, 1958 : 329–331, figs. 7, 10.

Material. 2 ex., SIKKIM, Gantok, 5,000 ft., 19.v.1924 (*R. W. G. Hingston*) (1 ex., var. *pracuae* Weise) ; Singhik, 3,500 ft., 23.iv.1924 (*R. W. G. Hingston*) (1 ex., var. *nigromaculata* Mader).

The species is widely distributed in the Himalaya, northern India, Burma and Tibet. It is very variable in colour-pattern. In life the beetles are red and black, the red subsequently fading into light brown in museum specimens.

Oenopia kirbyi Mulsant

Oenopia kirbyi Mulsant, 1850 : 425 [Type loc., Eastern India].

Material. 2 ex., INDIA, Kalimpong, 4,000 ft. (Darjeeling district), 27.iii.1924 (*R. W. G. Hingston*).

This is another species of *Oenopia* which is quite common in the eastern Himalaya. It has also been recorded from Burma. Its colour-pattern is very characteristic and in life very beautiful, being lemon-yellow and black.

Oenopia sauzeti Mulsant

Oenopia sauzeti Mulsant, 1866 : 281 ; 1870 : 55 [Type loc., India].
Oenopia sauzeti Mulsant ; Kapur, 1958 : 331–333, fig. 11.

Material. 1 ex., SIKKIM, Singhik, 4,000 ft., 23.iv.1924 (*R. W. G. Hingston*) ; 1 ex., SIKKIM, Gantok, 5,000 ft., 26.vii.1924 (*R. W. G. Hingston*).

Oenopia quadripunctata **sp. n.**

(Text-figs. 10A–E)

♂, ♀. Body shortly oval, moderately convex. Head black excepting the grey eyes and the brown canthus, antennae, anterior margin of labrum, the mandibles, maxillae and greater part of labium and its palpi. Pronotum (Text-fig. 10, A) black except a quadrangular flavous area on either side extending from the anterior margin to almost the base. Scutellum black. Elytron black excepting an obliquely oval, sub-basal and premedian flavous spot, another roundish and postmedian flavous spot and the flavous lateral margin composed as if of two semicircular spots butting on a narrower lateral border as shown in Text-fig. 10, A. Underside black except for the brown prothoracic and elytral epipleura, dark brown trochanters and the brown apices of the femora, the tibiae, tarsi and abdominal sternites.

Head with fine, shallowly impressed and fairly close punctures on a rather matt surface ; antennae rather short, extending at the most to as far as the foveae in the prothoracic epipleura. *Pronotum* moderately deeply emarginate in front, anterior angles widely rounded, posterior angles also rounded, punctation similar to that on the head. *Scutellum* triangular, base slightly wider than the sides, narrowly margined near the apex. *Elytra* with the lateral margins moderately expanded from near the shoulder angle to nearly as far as the apex ; the humeral callus indistinct, punctation impressed, only slightly coarser and sparser than that on the pronotum, spaces between the punctures shining. *Underside* with the prosternum and mesosternum coarsely and impressedly punctate, the former with two sub-parallel carinae reaching the anterior margin ; metasternum with fine and sparse punctation in the middle ; abdominal lines incomplete, terminal. *Male genitalia* with broad basal piece and oblong median lobe which is deeply and broadly emarginate apically (Text-fig. 10, D), parameres also broad and rounded at the apex, with long marginal setae ; the sipho widely curved and tapering towards the apex (Text-fig. 10, E). *Female genitalia* with the genital plates (ix sternite) triangular, elongate (Text-fig. 10, B), each with a well-formed papilla bearing a few setae ; spermatheca sausage-like, with an elongate ramus and nodulus as shown in Text-fig. 10, C.

Length ♂ 3·0 mm., ♀ 3·5 mm.; breadth ♂ 2·5 mm., ♀ 2·9 mm.

Holotype. 1 ♂, INDIA, Shillong (Assam), 11.iii.1960, on orange tree (*S. N. Prasad*) ; in the Z.S.I. collection, Calcutta (Reg. No. 14695/H4). (Male genitalia mounted between coverslips and on the same pin as the specimen.)

Allotype. 1 ♀, INDIA, Kalimpong, 4,000 ft., 27.iii.1924 (*R. W. G. Hingston*) in the British Museum (N.H.), London.

Paratypes. 1 ♀, with the same data as the holotype ; 1 ex., INDIA, Shillong, Kench's Trace (Assam), 14.iii.1960 (*T. G. Vazirani*) ; 1 ex., Shillong, Kench's Trace, 15.iii.1960 (*S. N. Prasad*). 1 ♀, SIKKIM, Lachung, 2,727 m., 6.vii.1959 (*A. G. K. Menon*). 1 ex., BURMA, Dingliang, 2,450 ft. (*ca.* 747 m.), Mishmi Hills, 12.iii.1935 (*M. Steele*) ; 1 ex., Mondon, Mishmi Hills (*M. Steele*) ; 1 paratype in B.M. (N.H.), the rest in Z.S.I. collection.

This species has a very pretty colour-pattern which is distinct from other known species of the genus. It is nearly as shortly oval as *Oenopia luteopustulata* Mulsant, but less convex. The female genitalia in the two are very distinct, the spermatheca

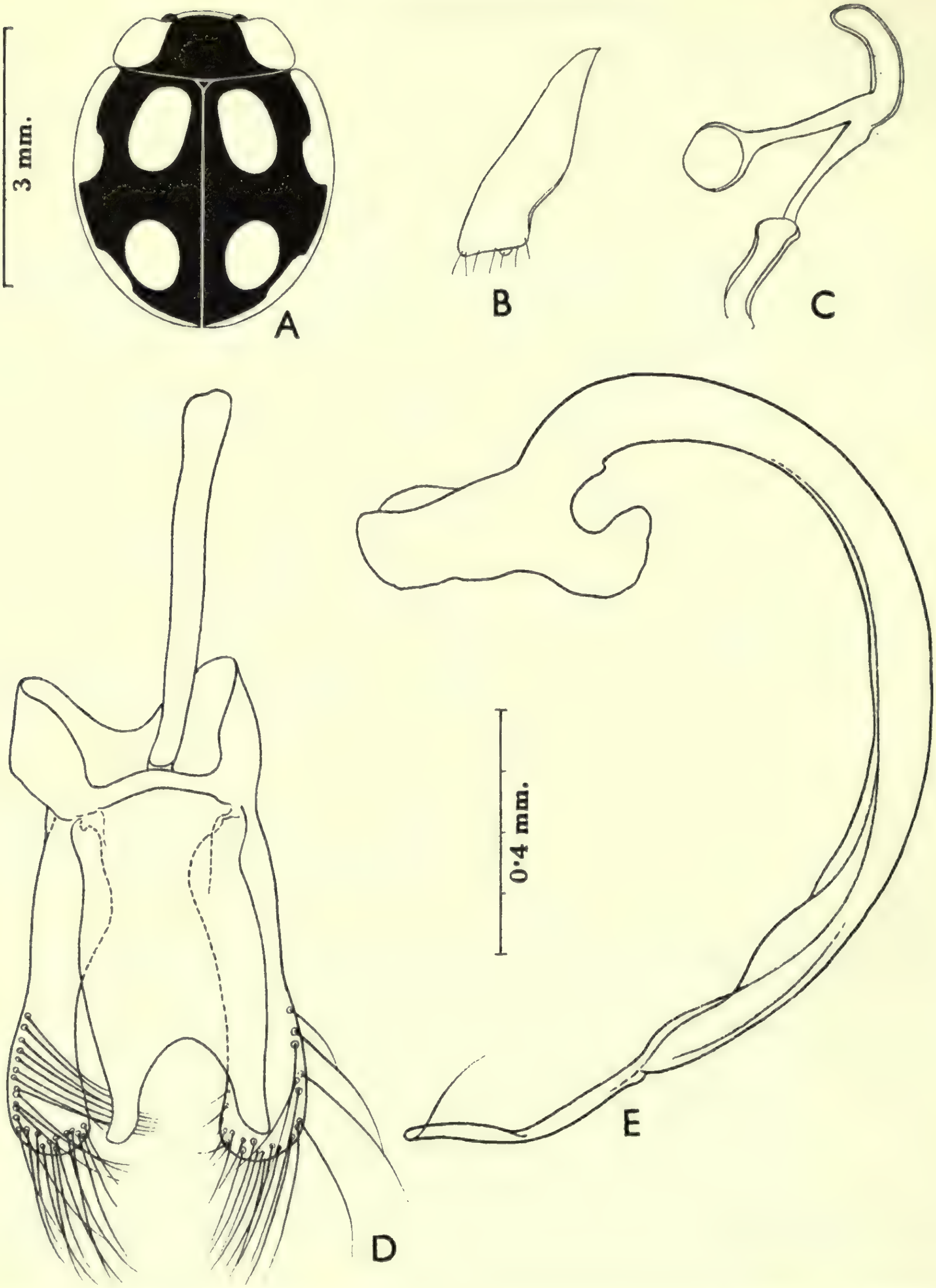

FIG. 10. *Oenopia quadripunctata*, sp. n. A, outline showing the pattern. B, genital plate of the female. C, spermatheca of the same. D, male genitalia except the sipho. E, the sipho.

in the latter being greatly curved and the genital plates being not quite as elongate (*vide* Kapur, 1958, Text-fig. 10, *c*, *d*). The spermatheca of *quadripunctata* is like that of *Oenopia sauzeti* Mulsant, though the infundibulum and ramus are different in outlines ; the genital plates (ix sternite) are also distinct in the two species. The elytral margin in *O. quadripunctata* is more expanded than that of *O. sauzeti*. The elytral patterns in the two species are also distinct.

Coelophora sexareata Mulsant

Coelophora sexareata Mulsant, 1853 : 181 [Type loc., N. India].
Coelophora sexareata Mulsant ; Korschefsky, 1932 : 296.

Material. 1 ♂, 1 ♀, INDIA, Kalimpong, 4,000 ft., 27.iii.1924 (*R. W. G. Hingston*) ; 1 ♀, SIKKIM, Gantok, 5,000 ft., 26.vii.1924 (*R. W. G. Hingston*).

This species is widely distributed in northern India and neighbouring countries having been previously recorded from northern Bengal, Bihar, Assam, Sikkim, Nepal, Burma and West Yunnan. More recently (1958) I have collected it from Simla Hills (*ca.* 8,000 ft.). In life the colour of the elytral areoles is carmine red rather than ochreous which is the colour seen in museum collections. The sexes are easily distinguished by the frons of head being flavous in the male and black or piceous in the female.

Coelophora nitidicollis **sp. n.**

(Text-figs. 11A–C)

♂. Body subhemispherical (Text-fig. 11, A). Head flavous in front, eyes piceous, the antennae, except the club which is darker, and mouth-parts brown. Pronotum mostly shining black with a green lustre, except along the anterior and lateral margins which are translucent ; anterior margin of the black part of pronotum with two deep and oblique notches near each anterior angle. Scutellum black. Elytra testaceous except for a common sutural black stripe and an ill-defined, rather piceous, submarginal vitta running close to lateral margin ; the vittae tapering at either end. The underside testaceous except for the flavous epimera, the black meso- and metasterna and the testaceous legs.

Head with coarse, rather impressed and sparse punctures over a matt surface, the antennae extending beyond the middle of the thoracic epipleura, apex of the club obliquely truncate. *Pronotum* with anterior margin fairly deeply emarginate, anterior and posterior angles rounded, the lateral margins moderately so, punctures a little finer than those on the head, impressed and fairly close, the spaces between punctures smooth. *Scutellum* triangular, with the base, slightly wider than the sides, with very few, fine and shallow punctures. *Elytra* with the lateral margins expanded from the shoulder angles till almost the apex, the humeral callus rather ill-defined, the punctures on the discal area similar to, though less impressed than those on the pronotum, coarser and impressed near the sutural and the expanded lateral margins, the spaces between punctures not as smooth as in the case of the pronotum. *Underside* with the prosternal carinae moderately defined, convergent, meeting below the middle of the sternum; mesosternum coarsely punctate, metasternum with similar punctation except in the median part where the punctures are fine and sparse ; the abdominal lines incomplete, subterminal, the last visible abdominal sternite in the male with a small median notch at the apex. *Male genitalia* (Text-fig. 11, B, C) with the basal piece broadly cup-shaped, the parameres elongate, a little bent at one-third of the length, slightly broader distally, a little shorter than the median lobe which is gradually narrowed distally to a pointed and a little up-curved apex ; the sipho long, broadly curved proximately, almost straight towards the apex.

♀. Unknown.

Length 4·25 mm. ; breadth 3·7 mm.

Holotype. ♂, Sikkim, Tsuntang, 7,000 ft., 25.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London.

This species is easily distinguishable from the other known species of the genus by the shining black, with a tinge of green, coloration of the pronotum, the colour-pattern of the elytra, and by the coarser punctation on the head. However, it resembles in several respects the Nepalese species, *Coelophora cincta* (Hope), which has a black pronotum with the anterior margin and the anterior two-thirds of the lateral margins bright testaceous ; furthermore its elytra are testaceous with a black border along the lateral margins but without any black, common or sutural stripe.

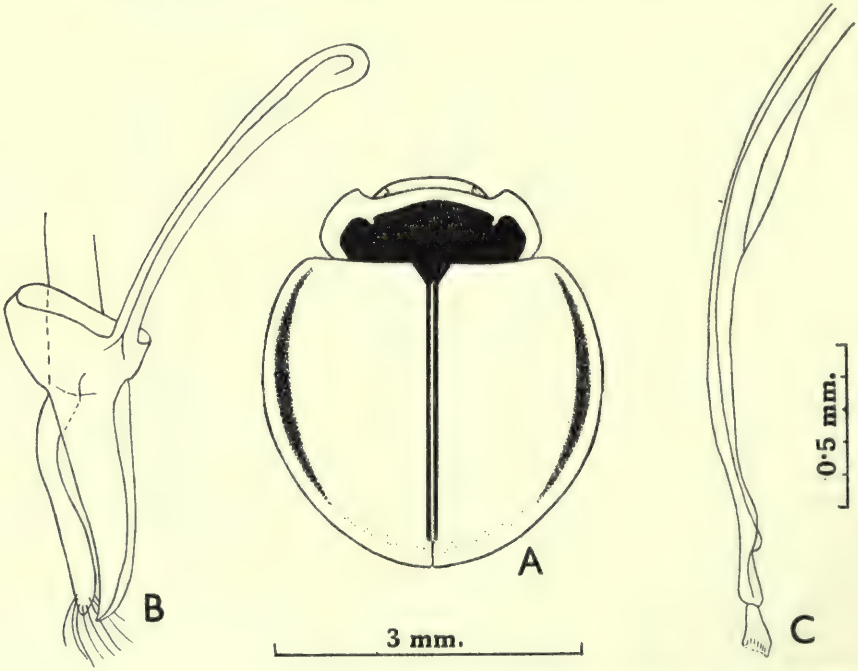

Fig. 11. *Coelophora nitidicollis*, sp. n. A, outline showing the pattern. B, male genitalia without the sipho. C, apex of the sipho. (3 mm. scale for fig. A ; 0·5 mm. scale for figs. B, C.)

Tribe **Hippodamiini**

Hippodamia heydeni (Weise)

(Text-figs. 12A–G)

Semiadalia heydeni Weise, 1892 : 109 [Type loc., Margelan].
Hippodamia heydeni (Weise) Dobzhansky, 1927 : 216.
Hippodamia heydeni (Weise) ; Mader, 1928 : 57, pl. 9, figs. 1–4.
Hippodamia heydeni (Weise) ; Kapur, 1957 : 269–270, fig 1.

Material. 2 ex., Tibet, Tashidzom, 14,500 ft., 9.v.1924 (*R. W. G. Hingston*), 4 ex., Tibet, Shekkar, 14,500 ft., 9.vii.1924 (*R. W. G. Hingston*).

This species, occurring at high altitudes in Tibet, shows great variation in colour-pattern (*vide* Mader, 1928 ; Kapur, 1957). The patterns of five out of the six examples mentioned above are sketched in Text-fig. 12, A–E, and show how great is the extent of variation in this species. Male genitalia, which offer the most reliable character for identification, are shown in Text-fig. 12, F, G.

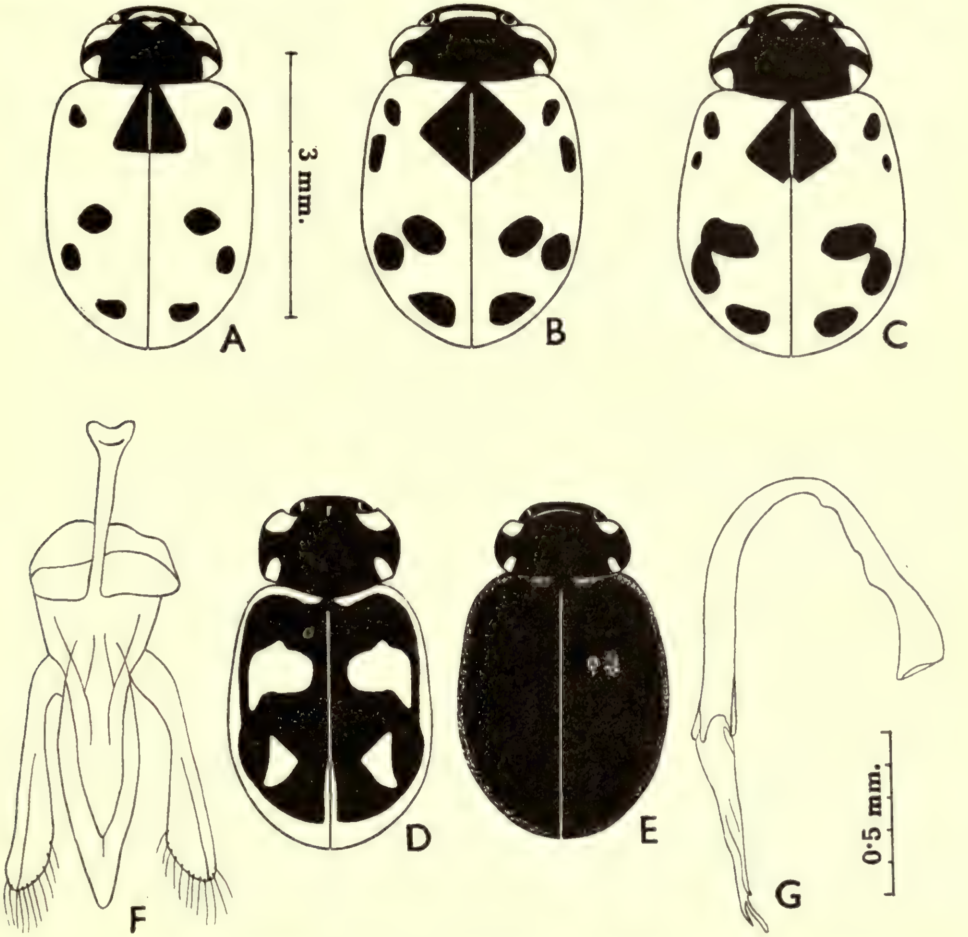

FIG. 12. *Hippodamia heydeni* (Weise). A–E, outlines showing five different patterns. F, male genitalia without the sipho. G, the sipho. (3 mm. scale for figs. A–E ; 0·5 mm. scale for figs. F, G.)

Adonia variegata (Goeze)

Coccinella variegata Goeze, 1777 : 246 [Type loc., Europe].
Adonia variegata (Goeze) Mulsant, 1846 : 39.
Adonia variegata (Goeze) ; Korschefsky, 1932 : 346–359.
Adonia variegata (Goeze) ; Kapur, 1957 : 269–273, fig. 2.

Material. 40 ex., TIBET, Tuna (Tibetan plateau), 14,500 ft., 11.iv.1924 ; Kampa Dozong, 14,500 ft., 29.iv.1924 ; Tinki Dozong, 14,000 ft., 1.v.1924 ; Shiling, 14,000 ft., 5.v.1924 ; Shekkar, 14,500 ft., 9.v.1924, and 9.vii.1924 ; Tashidozom, 14,500 ft., 29.v.1924 ; Tingri, 15,000 ft., 6.vii.1924 ; Chibbing, 14,500 ft., 13.vii.1924 (all *R. W. G. Hingston*).

The examples mentioned above come from high altitudes ranging between 14,000 ft. and 15,000 ft. As stated earlier (Kapur, 1957), the variation in the elytral patterns of these examples is remarkable, some 28 varieties being easily distinguishable in a collection of 40 specimens. The pronotum, though not quite so variable in its colour-pattern, is nevertheless generally dark, like the elytra, in the majority of examples.

All the above-mentioned examples from Tibet are smaller in size (length 3·2–4·2 mm., breadth 2·0–2·5 mm.) than those from the lower altitudes in India, and from Europe or Africa. Both in respect of the colour-pattern and size these examples are different from the subspecies *doubledayi* Mulsant (length 4·6–5·2 mm., breadth 2·8–3·0 mm.), so commonly found in the lower altitudes in the Himalaya.

Tribe **Coccinellini**

Adalia tetraspilota (Hope)

Coccinella tetraspilota Hope, *in* Gray, 1831 : 31 [Type loc., Nepal].
Adalia tetraspilota (Hope) Crotch, 1874 : 101.
Adalia tetraspilota (Hope) ; Korschefsky, 1932 : 434.
Adalia tetraspilota (Hope) ; Mader, 1929 : 114, pl. 23, fig. 7.

Material. 1 ♂, SIKKIM, Rongli Chu, 3,000 ft., 29.iii.1924 (*R. W. G. Hingston*).

Though first described from Nepal the species has since been recorded from Bokhara, West Turkestan (*vide* Korschefsky, 1932 : 434), Afghanistan, etc. I have collected it from Baluchistan (West Pakistan) and Kashmir (India). The above example possesses two very small additional black spots on each elytron ; one of these is situated midway between the elytral base and the discal spot while the other is at the external margin and almost level with the sutural and discal spots. The male genitalia of this example are identical with that of the example with the typical elytral pattern. Several varieties with additional or reduced number of elytral spots have been named in literature (*vide*, Mader, 1929 : 114).

Lioadalia luteopicta (Mulsant)

Adalia luteopicta Mulsant, 1866 : 45 [Type loc., E. Indies].
Lioadalia luteopicta (Mulsant) Crotch, 1874 : 104.
Lioadalia luteopicta (Mulsant) ; Mader, 1930 : 134, pl. 28, fig. 29.
Adalia luteopicta Mulsant ; Korschefsky, 1932 : 433.
Adalia luteopicta Mulsant ; Kapur, 1958 : 326–327, fig. 6, e, f.

Material. 6 ex., TIBET, Tangu, 11,500 ft., 26.iv.1924 ; Tasam, Rongshar Valley, 12,000 ft., 20.vi.1924 ; Rongshar Valley, 13,000 ft., 1.vii.1924 ; Chambi Valley, 11,000 ft., 22.vii.1924 ; Yatung, 11,000 ft., 25.vii.1924 (2 ex.) (all *R. W. G. Hingston*).

Korschefsky (1932 : 433) gave its distribution as North and East India and China. I have recorded it from Nepal, Sikkim and Dehra Dun (Kapur, 1958 : 326–7) and have seen examples from several other parts of north India.

The generic name *Lioadalia* was proposed by Crotch to include the above and three other species ; two of the latter were from Africa and one from South America. He distinguished *Lioadalia* from *Adalia* " by the extremely fine, obsolete punctation ". Mader (1930 : 134) has further defined the genus and after seeing long series of the species, I support both Crotch and Mader in regarding it as distinct from other species of *Adalia* Mulsant. It is not certain how far our species is congeneric with *L. flavomaculata* (de Geer) the type species of the genus from S. Africa, but until further studies, it seems desirable to include the material under report in the genus *Lioadalia* Crotch.

Synharmonia billieti (Mulsant)

Harmonia billieti Mulsant, 1853 : 144 [Type loc., North-East India].
Synharmonia billieti (Mulsant) Mader, 1931 : 191, pl. 40, figs. 1, 2.
Coccinella billieti (Mulsant) Korschefsky, 1932 : 447.
Coccinella (*Synharmonia*) *billieti* (Mulsant) ; Kapur, 1958 : 327, text-fig. 9, a–j.

Material. 1 ♀, TIBET, Rongshar Valley, 9,500 ft., 25.vi.1924 (*R. W. G. Hingston*).

The above-mentioned example belongs to the variety *testacea* (Kapur, 1958 : 327) but differs slightly from the typical pattern of the variety in that lateral parts of the pronotum are entirely light testaceous. The species is very variable in coloration and is widely distributed in the Himalaya. It seems advisable to regard *Synharmonia* Ganglbauer, 1899, as a distinct genus and to treat *billieti* as one of its species on the basis of its external body and genitalic characters.

Synharmonia signatella (Mulsant)

Harmonia signatella Mulsant, 1866 : 58 [Type loc., N. India].
Coccinella signatella (Mulsant) Crotch, 1874 : 110.
Synharmonia signatella (Mulsant) Mader, 1931 : 199, pl. 42, fig. 4.
Coccinella (*Synharmonia*) *signatella* (Mulsant) ; Korschefsky, 1932 : 494 [Himalaya].

Material. 1 ♂, INDIA, Darjeeling, 7,000 ft., 1–14.iv.1924 (*Miss Wetherall*), 1 ♀, SIKKIM, Tangu, 11,000 ft., 26.iv.1924 (*R. W. G. Hingston*).

Recorded earlier from the " Himalaya ", the exact locality being unknown. It is a beautiful species with seven black spots on the pronotum, an entirely black scutellum and spotless elytra. Two further examples from Darjeeling and one from Manipur are present in the Z.S.I. collection, and one example from Mishmi Hills, Burma, present in the B.M. (N.H.) collection that is on loan for study with me.

Coccinella magnopunctata Rybakow

Coccinella undecimpunctata magnopunctata Rybakow, 1889 : 289 [Type loc., Central Asia].
Coccinella magnopunctata Rybakow ; Dobzhansky, 1926 : 22, fig. 3 (♂ genitalia).
Coccinella magnopunctata Rybakow ; Korschefsky, 1932 : 469.

Material. 1 ex., TIBET, Tibetan plateau, 14,000 ft., —.iv.1924 ; 4 exs., Shekkar, 14,500 ft., 8.vii.1924 (*R. W. G. Hingston* coll.).

This species resembles the eleven-spotted lady-beetle, but is easily recognisable by the shape of the flavous area near the anterior angles of pronotum and by the large elytral spots. The male genitalia agree with those illustrated by Dobzhansky (1926 : 22). The species is already recorded from Tibet as well as Kashmir (*vide*, Korschefsky, 1932 : 469).

***Coccinella tibetina* sp. n.**

(Text-figs. 13A–D)

♂, ♀. Body subovate, moderately convex (Text-fig. 13, A), more or less like *Coccinella magnopunctata* Rybakow in outline. Head black, except for the greyish eyes and a pair of pale-testaceous, oval to roundish spots on the frons, each spot being near the inner margin of the eye ; pronotum black with a pale-testaceous, subquadrate spot at each anterior angle, the spot widely emarginate posteriorly ; scutellum black, elytra testaceous, each with four black spots as follows : the scutellar spot about 1 mm. long, 0·7 mm. wide, nearly semicircular, with the base lying along the suture, forming a complete, subrounded spot with its opposite number on the other elytron ; the subhumeral spot situated just below the humeral callus and close to, though not touching, the lateral margin, almost circular in outline, the diameter being nearly 0·6 mm.; the discal spot transverse, 0·6–0·7 mm. long, 1–1·2 mm. broad, situated below the level of the apex of the postscutellar spot, and nearer the sutural than the lateral margin ; the subapical spot also transverse, much larger, 0·7 mm. long and 1·5 mm. broad, appearing as if it were composed of two confluent spots. Underside black except for a small, pale brown part of the pronotal epipleura and the testaceous elytral epipleura.

Head with moderately fine, close and rather shallowly impressed punctation and a few greyish hairs on the clypeus. *Pronotum* with the punctation very fine, impressed and closer than is the case on the head ; anterior angles and lateral margins impressed. *Scutellum* small with eight to ten fine and impressed punctures. *Elytra* slightly longer than the breadth of the two together, broadest behind the middle, moderately convex, the anterior angles broadly and the lateral margins moderately rounded, both narrowly bordered except near the apices of the latter, punctation fine, impressed and nearly as close as that on the pronotum. *Underside* with the prosternal carinae short and weak ; the outer fork of the abdominal line also weak or missing. *Male genitalia* (Text-fig. 13, B) with the basal piece subquadrate, nearly as long as broad, rounded anterolaterally, broadly emarginate in the middle ; median lobe nearly twice as long as the basal piece, gradually narrowed and for the most part conical, with a rounded apex ; parameres nearly two-thirds the length of the median lobe, uniformly narrow and straight at the sides with rounded apex, and a number of moderately long setae in the apical half ; sipho (Text-fig. 13, C) with the siphonal capsule much developed, bent almost double in the proximal half of its length, expanded twice (proximally more widely so than subapically), before the pointed apex. *Female genitalia* characterized by the cornu (*c*) of the spermatheca (Text-fig. 13, D) being uniformally narrow and straight except for a slight bend at the distal one-fourth of its length, the ramus (*r*) short, a little narrower than cornu, the nodulus (*n*) also short and narrow, infundibulum (*i*) much narrower for the proximal two-thirds of its length, accessory plate absent.

Length 5·4–5·8 mm. ; breadth 4·2–4·4 mm.

Holotype. ♂, Tibet, Phari, 14,000 ft., 21.vii.1924 (*R. W. G. Hingston*) ; in the British Museum (N.H.), London. (Genitalia mounted between two coverslips and attached to the same pin as the specimen.)

Allotype. ♀, Tibet, Zayul, Chutong (S.E. Tibet), 13,000 ft., 22.vi.1933 (*Kingdon Ward* and *R. J. H. Kaulback*), in the British Museum (N.H.). (Genitalia mounted as above.)

Paratypes. 3 ex.: 1 ♀ with the same data as the allotype in the Z.S.I. collection, Calcutta; 2 ♂, from TIBET, Zayul, Atakang, 13,000 ft., 9.vi.1933 and 1.vii.1933 (*Kingdon Ward* and *R. J. H. Kaulback*), one each in B.M. (N.H.) and Z.S.I. collection.

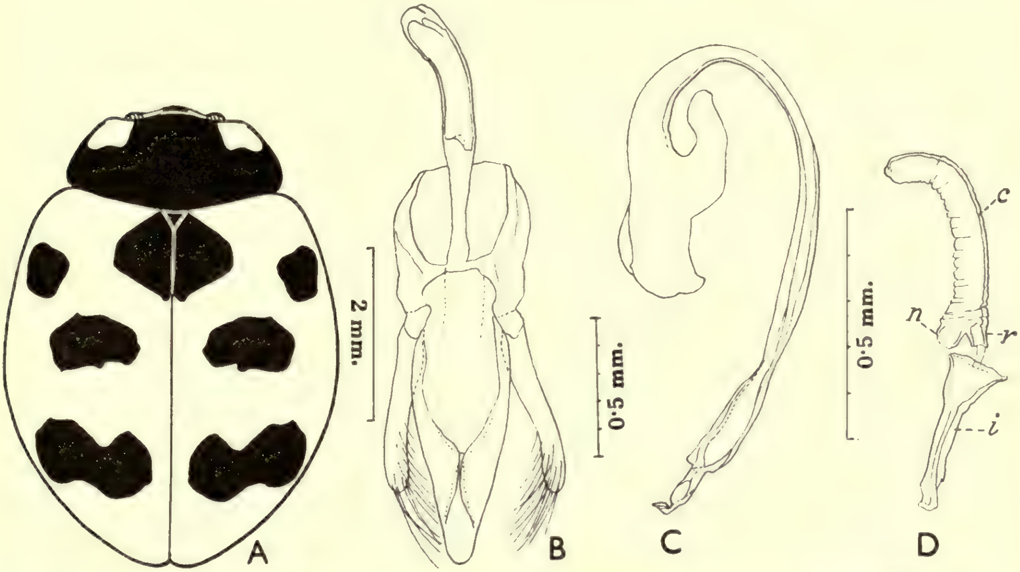

FIG. 13. *Coccinella tibetina*, sp. n. A, outline showing the pattern. B, male genitalia without the sipho. C, the sipho. D, spermatheca.

In the five examples before me the colour-pattern is strikingly alike. The species comes close to *Coccinella nivicola* Ménètries (from Eastern Siberia) in general shape and structure but is easily distinguishable from it by the presence of an antero-lateral or sub-humeral spot situated below the humeral callus, and by the relatively large size of the scutellar and the subapical spots; the mesepimera and metepimera are black in all the five examples. The male genitalia resemble, on the whole, those of *C. nivicola* but are distinguishable by the slightly narrower outline of the median lobe. The female genitalia are relatively more distinctive in the two species, the cornu of the spermatheca in *C. tibetina* is neither distinctly narrowed towards the apex nor deeply curved in the middle, as is the case in *C. nivicola*.

Coccinella lama **sp. n.**

(Text-figs. 14A–D)

♂, ♀. Body subovate (Text-fig. 14, A), moderately convex, in shape rather like *Coccinella magnopunctata* Rybakow, though slightly narrower anteriorly and smaller in size. Head black, with a white spot on each side near the inner margin of the eye; pronotum black, with a white, sub-quadrate mark at each anterior angle, the mark widely emarginate posteriorly; scutellum black; elytra testaceous, each with four[1] spots (½, 1, 1, 1) as follows: a moderately large, pear-shaped scutellar spot (½) ; a small, roundish, black spot, situated at about one-third the length of the elytron and nearer the lateral than the sutural margin and not touching the former ; a discal spot, larger than the preceding spot, usually roundish, situated on the disc of the elytron, at about the same distance from the suture as its own width ; the last, or the subapical marginal spot, usually transverse oval and slightly larger than the discal spot, situated at about two-thirds the length of the elytron and close to the external margin but not touching the same. A whitish, semicircular to subtriangular mark also present at the base of the elytron close to the scutellum. Underside black except for the narrow and generally small, whitish area at the anterior angles of the prothoracic epipleura, the testaceous elytral epipleura, the white mesepimera and metepimera, and in the male a whitish spot on the anterior coxae.

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[1] These would correspond to spots No. 2, 3 and 4 of Dobzhansky (1931, *Proc. U.S. nat. Mus.* **80** (4), p. 27, f. 30), the spots 1 and 5 of the hypothetical basic pattern of the genus being absent in this species.

Head with rather fine, close and impressed punctures. *Pronotum* with similar or a little finer punctation, with the lateral margins impressed. *Scutellum* small, with six to eight small and shallow punctures. *Elytra* moderately convex, the shoulder angle broadly rounded anteriorly, the lateral margin narrowly bordered from the shoulder angle to nearly three fourths the length of the elytron, punctation fine, impressed and nearly as close as that on the pronotum. *Underside* with the prosternal carinae subparallel and hardly reaching beyond the level of the anterior coxae, the abdominal line on the first abdominal segment crossed by an oblique line. *Male genitalia* (Text-fig. 14, B) with the median lobe broadly pear-shaped in the basal half, drawn out into a narrow elongate process in the distal half, parameres shorter than the median lobe, nearly uniformly wide, rounded at the apex, with a number of short to moderately long hairs along the margin in the distal half ; sipho arched proximally, siphonal capsule well developed, lying almost parallel to the remainder of the sipho which is nearly straight and narrowed distally, with the lateral margins a little below the apex narrowly expanded (Text-fig. 14, C). *Female genitalia* (Text-fig. 14, D) with the spermatheca having the cornu narrowed towards the apex, with a short ramus (*r*) and with the infundibulum (*i*) dilated a little at both ends, accessory plate present.

Length 4·4–4·5 mm.; width 3·1–3·2 mm.

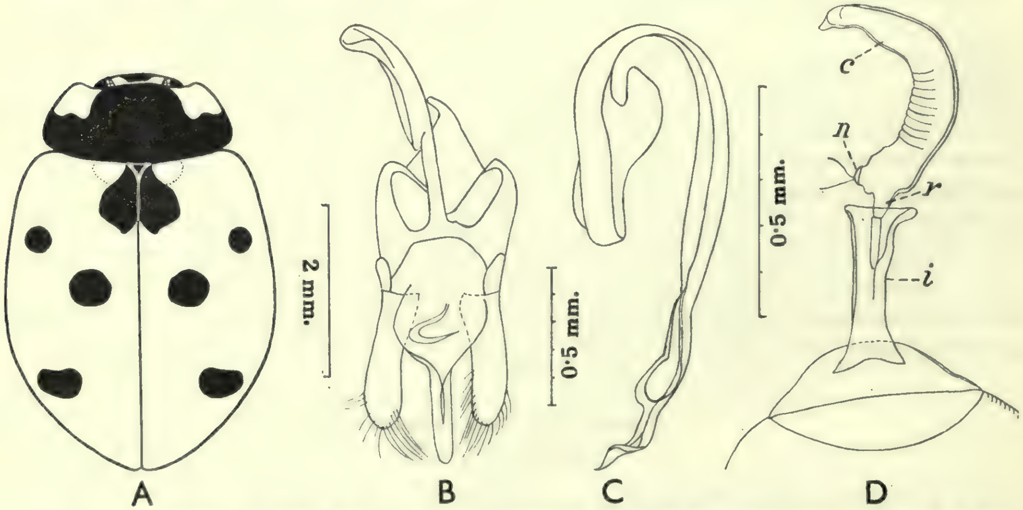

FIG. 14. *Coccinella lama*, sp. n. A, outline showing the pattern. B, male genitalia without the sipho. C, the sipho. D, spermatheca.

Holotype. ♂, TIBET, Shekkar, 14,500 ft., 8.vii.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (Genitalia mounted between two coverslips and attached to the same pin as the specimen.)

Allotype. ♀, with the same data as the holotype, in the British Museum (N.H.), London. (Genitalia also mounted between two cover-slips as above.)

Paratypes. 9 ♂, ♀, with the same data as the holotype ; 1 ex., TIBET, Tingri, 15,000 ft., 6.vii.1924 (*R. W. G. Hingston*), 1 ex., TIBET, Kyishong, 14,500 ft., 10.vii.1924 (*R. W. G. Hingston*). (4 paratypes from Shekkar in the Z.S.I. collection, Calcutta, and the rest in the B.M.)

Coccinella lama can easily be distinguished from *Coccinella magnopunctata* Rybakow by the colour-pattern of the pronotum and the reduced number of elytral black spots, there being eleven such spots on the elytra in the latter and seven in the former ; besides, the size of the spots in *C. magnopunctata* is large, and the genitalia (♂, ♀) very distinctive for the species. *C. lama* is easily distinguishable by its smaller size from most examples of *Coccinella septempunctata* Linnaeus which it resembles in general coloration. The latter is a very variable species both in respect of its size and pattern : some of its smaller examples may therefore superficially resemble *C. lama*. The latter may, however, be recognized by the larger, pear-shaped scutellar spot, the white metepimera (which in *C. septempunctata* are usually brown and rarely white) and the white mark on the first coxae in the male. The male genitalia in the two species are very distinct ; the basal piece and the median lobe are subconical in *C. septempunctata*, while the basal piece is broad and the median lobe very much narrowed and finger-like in the distal half in *C. lama*. In respect of the female genitalia, *C. lama* is easily distinguishable by the shorter ramus and nodulus of spermatheca. The species is a denizen of high altitudes and apparently belongs to the *C. septempunctata* group of species in the genus.

***Coccinella nigrovittata* sp. n.**

(Text-figs. 15A–F)

♂, ♀. Body oval, maximum width just behind the middle of the body length, moderately convex (Text-fig. 15, A). Head black except for the two pale testaceous or whitish, ill-defined, spots on the frons (one each near the inner margin of the eye), the whitish subcanthus, and the brown to piceous antennae and mouth-parts. Pronotum black, except the pale testaceous narrow border along the anterior margin, the slightly wider triangular area at anterior angles and a narrow border along the lateral margin. Scutellum black. Elytra testaceous, each with a black, shortly elongate spot on the suture immediately behind the scutellum and extending to about one-sixth the length of the elytron ; one long, black stripe or vitta present, commencing from the humeral callus and extending, slightly obliquely, to the five-sixths the length of elytron and being usually as wide as one-fourth to one-third the width of elytron. Underside black except the whitish anterior half of the prothoracic epipleura and the mesepimera and the testaceous elytral epipleura.

Head with the frons having fairly impressed, fine, rather sparse punctures and a few short dark hairs ; antennae a little shorter than the width of the head, with a rather well-defined club composed of the three terminal segments. *Pronotum* nearly twice as wide as long, moderately emarginate at the anterior margin, the anterior angles rather acute and the posterior obtuse ; the lateral margins moderately rounded ; punctation impressed, coarser and closer than that on the head. *Scutellum* triangular, having a few very fine punctures. *Elytra* oblong (7 : 9), moderately convex, with humeral calli indistinct, the shoulder-angles wide, the lateral margin, moderately curved, especially in the basal half of their length ; punctation similar to or slightly coarser than that on the pronotum but sparser and rather less impressed.

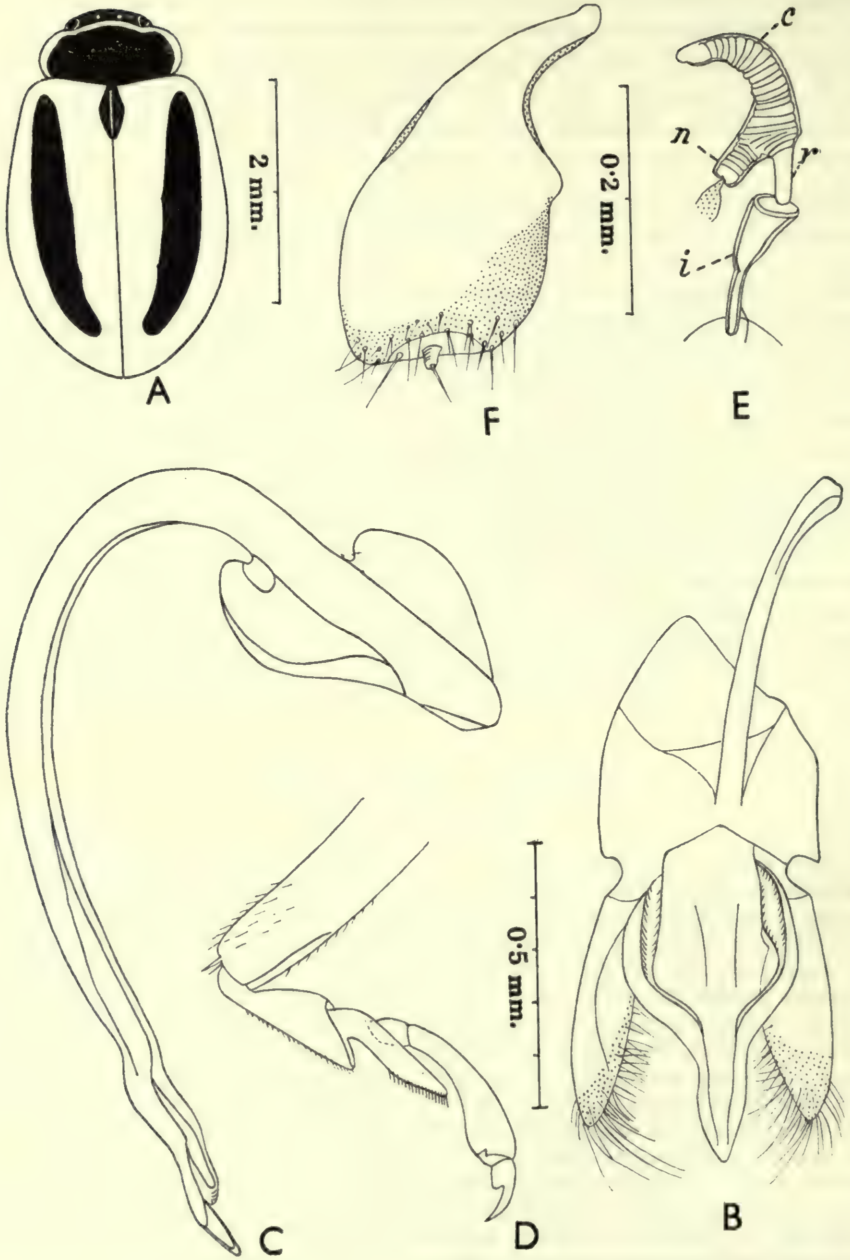

FIG. 15. *Coccinella nigrovittata*, sp. n. A, outline showing the pattern. B, male genitalia except the sipho. C, the sipho. D, tarsi and a tarsal claw. E, spermatheca. F, a genital plate of the female. (2 mm. scale for fig. A ; 0·5 mm. scale for figs. B–D, F ; 0·2 mm. scale for fig. E.)

Underside with the prosternal carinae sub-parallel and extending as far as the middle of the length of prosternum and hardly beyond the level of the front coxal cavities ; the mesosternum straight at the base ; abdominal lines incomplete, cut across obliquely by a line as in most other species of *Coccinella* ; the last abdominal sternite in the male widely emarginate at the apex, rounded in the female. *Male genitalia* (Text-fig. 15, B) with the median lobe only slightly narrower than the basal piece in the proximal half and suddenly narrowed in the distal half to an almost acute point at the apex ; parameres a little shorter than the median lobe, blade-like and beset with a number of short setae in the distal half ; sipho (Text-fig. 15, C) with an enlarged siphonal capsule, almost curved at a right angle at a little distance before the siphonal capsule and gradually narrowed towards the apex. *Female genitalia* with the genital plate (ix sternite) pear-shaped with a distinct papilla in the middle (Text-fig. 15, F) ; spermatheca (Text-fig. 15, E) with the cornu (*c*) moderately bent in the middle, slightly narrowed distally, the ramus (*r*) well developed and wide, the nodulus (*n*) elongate, and the infundibulum (*i*) funnel-shaped, the accessory plate absent.

Length 3·2 mm.; width 2·1 mm.

Holotype. ♂, TIBET, Kampa Dzong, 14,500 ft., 29.iv.1924 (*R. W. G. Hingston*) in the British Museum (N.H.), London. (Genitalia and abdominal sternites mounted between two coverslips and on the same pin as the specimen.)

Allotype. ♀ with the same data as the holotype, in the British Museum (N.H.). Damaged and with the left elytron missing. (Genitalia and abdominal sternites mounted between two coverslips and on the same pin as the specimen.)

On account of the somewhat elongate shape of the body and the coloration of pronotum and elytra, this species appears to be an aberrant one in the genus. The antennae and mouth-parts, the prosternal carinae, shape of the mesosternum and of the abdominal lines, the structure of the legs and claws and the male and female genitalia are as in typical members of the genus. It may be compared in size and general shape with *Synharmonia billieti* (Mulsant), which comes from various neighbouring parts in the Himalayas, but does not belong to the *Synharmonia* as the front of the median part of the mesosternum is not excised ; it also differs from other species of *Synharmonia* in the structure of the male and female genitalia. In respect of its female genital structure it comes relatively closer to *Coccinella hieroglyphica* Linn., the spermatheca and infundibulum being very much similar in general outline, the same is true of certain parts of the male genitalia such as the sipho, but the median lobe and the parameres are very distinct in the two species. Moreover, *C. hieroglyphica* is a larger species, being 3·7–4·3 mm. long, more rounded and convex, and has different coloration of the pronotum and elytra.

Calvia sykesi (Crotch)

Anisocalvia sykesi Crotch, 1874 : 146 [Type loc., " Dukhun (India Mus.) "].
Calvia (*Anisocalvia*) *sykesi* (Crotch) Korschefsky, 1932 : 529 [Distribution, " Dekkan "].

Material. 2 exs., INDIA, Darjeeling, 7,000 ft., 25–31.iii.1924 (*Miss Wetherall*) ; 1 ex., same locality, 1–14.vi.1924 (*Miss Wetherall*).

It has not been possible to locate in India the place " Dukhun " as mentioned by Crotch. Korschefsky changed it to " Dekkan " (meaning Deccan!) for reasons best known to him. It is apparently for the first time that the species is being recorded from a better known locality in India. In addition, I have also collected this species from Shillong (Assam) from cabbage fields. It is worth recording here that the beetle is light green in colour when alive and that the colour gradually changes to light brown after death. As the subgenus *Anisocalvia* Crotch is rather ill-defined, it is better to place this species in the genus *Calvia* Mulsant.

Calvia shiva sp. n.

(Text-fig. 16A)

♂. Body shortly oval, moderately convex (Text-fig. 16, A). Head straw-yellow except the testaceous median part of clypeus, antennae and the dark grey eyes. Pronotum for the most part black to piceous except for the broad, lateral, testaceous area on either side and the relatively narrower, testaceous to translucent border (extended in the middle towards the disc) along the anterior margin ; in the middle of each testaceous area is a straw-yellow, suboval spot. Scutellum black. Elytra black except for the moderately wide testaceous external border and the six roundish, straw-yellow spots on each elytron, and, rather commonly, with a testaceous, roundish spot near the apex, arranged as 2, 2, 2, ½. The basal spot near the scutellum rounded, large (0·6 mm. diameter), touching the basal margin but not the suture ; the humeral spot, also rounded, a little smaller, situated on the external half of the humeral callus but neither touching the base nor the external testaceous border ; the next pair of spots are located on the transverse median line, each rounded and subequal, and not touching the sutural margin or the external border ; the further two spots situated at three-fourths the length of the elytron, rounded, of practically the same size as the preceding pair, the inner spot not touching the suture, the outer touching the testaceous border ; the apical, testaceous spot semicircular, situated on the suture and abutting on the external border. Underside testaceous, except for the metasternum and the median parts of the first four abdominal sternites.

Head sparsely and shallowly punctate on the front ; clypeus moderately emarginating the eyes, antennae fairly long and slender, 11-segmented, reaching the mesosternum. *Pronotum* transverse, (1 mm. long, 2·2 mm. broad), very coriaceous, with moderately sparse, fine and fairly impressed punctures. *Scutellum* triangular, the base longer than the sides, with about eight fine and shallow punctures. *Elytra* as long as the breadth of the two together, the external margin narrowly expanded and moderately sloping except near the apex ; shoulder-swelling distinct, punctation impressed, moderately coarse punctures intermixed with the fewer, relatively less coarse, punctures except near external margin where punctures are mostly coarse, the apical angles narrowly rounded. *Underside* with the prosternum rounded to somewhat pointed at the apex, with the pair of carinae slightly converging and extending as far as two-thirds the length of prosternum ; mesosternum emarginate in the middle of the anterior margin to accommodate the apex of prosternum ; metasternum with an impressed, longitudinal stria in the middle extending from the basal to the anterior margin, with a number of short, shallow and transverse striations and a few small and fine punctures over the surface ; abdominal lines incomplete. *Male genitalia* with the basal piece slightly broader than long ; the median lobe elongate, triangular, with the apical one-sixth moderately curved towards the parameres ; the sipho curved in almost a semicircle in the basal half and only slightly curved and gradually narrowed distally, the outer arm of the siphonal capsule narrow and nearly twice as long as the inner one, the apical part of the sipho characteristically wedge-shaped.

♀. Unknown.

Length 4·4 mm.; breadth 3·6 mm.

Holotype. ♂, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (Genitalia mounted between two coverslips and attached to the same pin as the specimen.)

Paratype. ♂, INDIA, N.E.F.A., 3 miles N.W. of Phudang, on footpath to Bhutan, 28.ix.1961 (*S. Biswas*) in Z.S.I. collection. (Genitalia mounted as above.)

This and the succeeding four species form a closely related assemblage which is apparently close to the group of species called *Calvia vishnu* (Crotch), *Calvia krishna* (Crotch), and *Calvia buddha* (Crotch), all from N. India and described by Crotch (1874) under the genus *Anisocalvia* Crotch which, as stated earlier, is ill-defined and not clearly distinguishable from *Calvia* Mulsant (1850). In respect of colour pattern *C. shiva* is very distinctive on account of the presence of six straw-yellow spots on a black elytron, as described above. However, it somewhat resembles *C. punctata* (Muls.), also from northern India, in that the elytral punctation is rather coarse, unequal and impressed, but on actual comparison of the examples of the two species, it becomes obvious that punctation in *C. punctata* is distinctly coarser and more unequal than is the case in *C. shiva*.

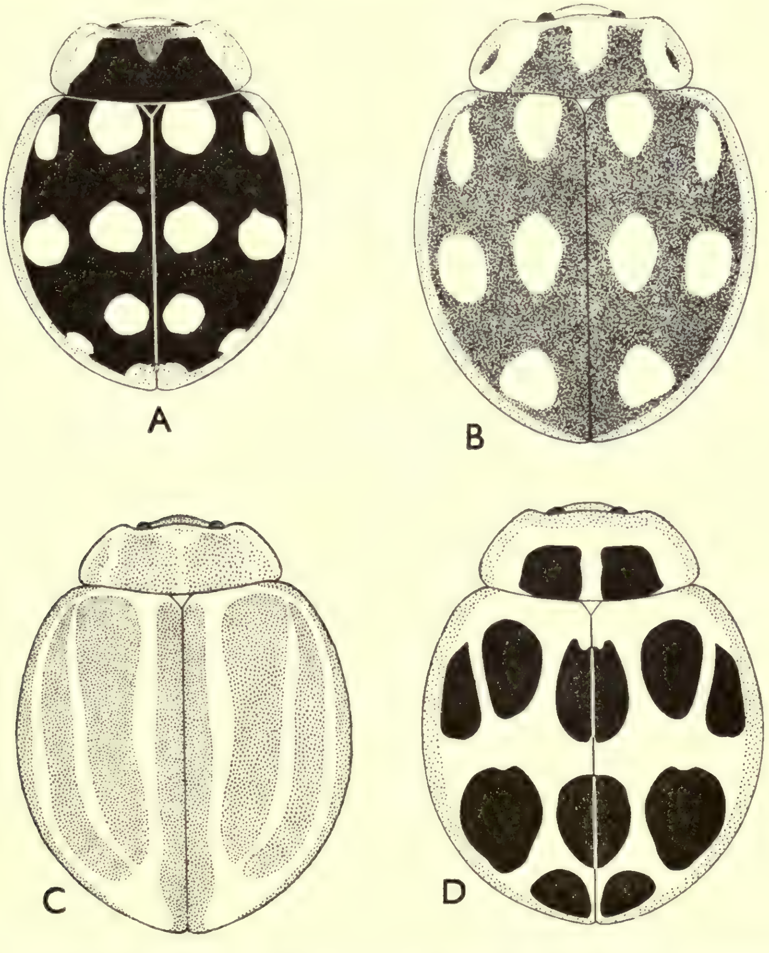

FIG. 16. Outlines showing the patterns : A, *Calvia shiva*, sp. n. B, *Calvia durgae*, sp. n. C, *Calvia trilochana*, sp. n. D, *Calvia pasupati*, sp. n.

Calvia durgae sp. n.

(Text-figs. 16B, 17H–I)

♀. Body shortly oval, a little more elongate and larger than *C. shiva*, moderately convex (Text-fig. 16, B). Head yellowish-testaceous in the front, eyes grey, mouth-parts and antennae testaceous. Pronotum with a broad, rather M-shaped, orange-testaceous spot in the middle, with three additional straw-yellow spots, the central one of which is oval and smaller than the other two which are rather elongate and touching the basal and anterior margins but not the lateral margins ; the external margins somewhat translucent. Scutellum straw-yellow. Elytra orange-testaceous except for the testaceous and somewhat translucent external borders and the five, roundish to shortly oval, straw-yellow testaceous spots on each elytron arranged as 2, 2, 1. The spot near the scutellum quite large, situated on the basal margin, more near the scutellar angle than near the humeral angle and extending as far as about one-fifth the length of the elytron ; the shoulder-spot smaller, roundish and situated on the external half of the humeral callus and extending a little below the level of the extremity of the sutural spot, not touching the external margin. The next two spots are situated on the transverse median line, rounded, slightly smaller than the spot near the scutellum, the inner one as near the suture as the latter, the outer spot equidistant from the inner spot and the external margin ; the fifth or subapical spot a little larger than the others, situated at four-fifths the length of the elytron, nearly equidistant from the lateral and the sutural margins. Underside testaceous except for the black metasternum.

Head similar to the *C. shiva* except that the antennae appear to be a little longer. *Pronotum* also similar but with the punctation slightly closer and a little less impressed. *Scutellum* similar. *Elytra* also similar except for the punctation which is for the most part uniform, moderately coarse and impressed ; only slightly coarser near the external border. *Underside* also similar except that the metasternum has a less impressed median longitudinal stria which becomes faint and indistinct in the distal half, the short transverse striae not clearly visible, the coarse, sparse and impressed punctures present in the anterior median area and the fine and sparse, moderately impressed punctures in the lateral area. *Female genitalia* with the genital plates (ix sternite) pear-shaped, nearly 0·5 mm. long, 0·25 mm. broad, much narrowed in the proximal half, rounded and broadened distally (Text-fig. 17, H), spermatheca (Text-fig. 17, I) curved into approximately three quarters of a circle, slightly expanded distally, with the apex rounded, the ramus short and truncate.

♂. Unknown.

Length 5·0 mm.; breadth 4·00 mm.

Holotype. ♀, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (Female genitalia mounted between two coverslips and on the same pin as the specimen.)

This species is slightly larger and more elongate than *C. shiva* described earlier ; it is also different from it in coloration and punctation as described above. On account of the general coloration, *i.e.*, the orange-testaceous elytra and the straw-yellow elytral spots, this species bears a superficial resemblance to *C. krishna* (Crotch), but the latter has on each elytron six spots which are narrowly margined with dark brown and are differently placed.

Calvia trilochana sp. n.

(Text-figs. 16C, 17J)

♂, ♀. Body shortly oval, a little more rounded than *C. durgae*, moderately convex (Text-fig. 16, C). Head testaceous, with a pair of small, ill-defined, opaque yellowish-testaceous marks on the frons, close to the eyes, and a similarly coloured line on the anterior margin of the clypeus ; the eyes are light grey, antennae and mouth-parts light testaceous. Pronotum testaceous, with three, rather ill-defined, longitudinal, straw-yellow vittae ; one in the centre of the other two, one each on either side, close to the lateral margin ; the external border rather translucent. Scutellum straw yellow. Elytra testaceous, each with three, straw-yellow, rather narrow vittae of uneven breadth, joined along the base and at the external apical area of the elytron, the first vitta parallel to the sutural margin and at about 0·3 mm. from it, the second at about two thirds the width of the elytron, passing by the outer side of the humeral callus and then for the most part of its length subparallel to the first vitta with which it joins in the subapical area ; the third vitta, which is very narrow, commences from the basal margin and runs parallel to the external margin before joining the other two near the apex of the elytron; the external margins of elytra a little translucent. Underside light testaceous except for the black mesosternum and median parts of first three abdominal sternites.

Head, *pronotum* and *scutellum* similar to *C. durgae* in the general outline and punctation. *Elytra* with the punctation uniform, but slightly coarser than in *C. durgae* and finer than in *C. shiva* or *C. punctata*. *Underside* with the pair of prosternal carinae rounded proximally and subparallel distally, not reaching the anterior margin ; prosternum and mesosternum very finely and sparsely punctate ; metathorax with the median longitudinal carina deep and present throughout the length, the punctation fine, impressed and sparse throughout. *Male genitalia* similar to those of *C. shiva* but with the median lobe broader and moderately humped before the subapical bend towards the parameres ; viewed from the front the median lobe is slightly constricted near the base, gradually expanded in the middle and narrowed to a conical apex ; apex of the sipho also distinct in outline and the character of chitinisation. *Female genitalia* with the genital plates (ix sternite) pear-shaped, relatively broader than those in *C. durgae* being two-thirds as broad as long (Text-fig. 17, J) ; spermatheca more or less similar in outline to that of *C. durgae* but slightly thicker.

Length 4·5 mm.; breadth 3·75 mm.

Holotype. ♂, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (Head, with the mouth-parts and antennae dissected and the abdomen with the male genitalia dissected and mounted between coverslips and attached to the pin bearing the specimen.)

Allotype. ♀, with the same data as the holotype ; in the Z.S.I. collection, Calcutta. (Female genitalia dissected and mounted between two coverslips and on the same pin as the specimen.)

This species may be compared with *Calvia albolineata* Schoenherr, described from China, on account of the general coloration ; *C. albolineata* besides being larger (5·1 mm. long and 4·5 mm. broad) and subhemispherical, has on each elytron four yellowish, sub-parallel lines, the two inner ones of which are united at their base and at two-thirds of their length ; the other two lines are independent, and differ in position from those of *C. trilochana* which, as described earlier, has only three lines, all of which join at the base and in the subapical area.

***Calvia pinaki* sp. n.**

(Text-figs. 17A–G)

♂, ♀. Body shortly oval (Text-fig. 17, A), moderately convex, with the declivity of the shoulder-swelling towards the lateral margin quite pronounced. Head brown, bordering on reddish-testaceous, except for the grey eyes and the reddish-testaceous apices of mandibles. Pronotum also brown, with a pair of subrounded, black spots near the base and a little distance away from either side of the scutellum which is testaceous. Elytra brown, altogether with

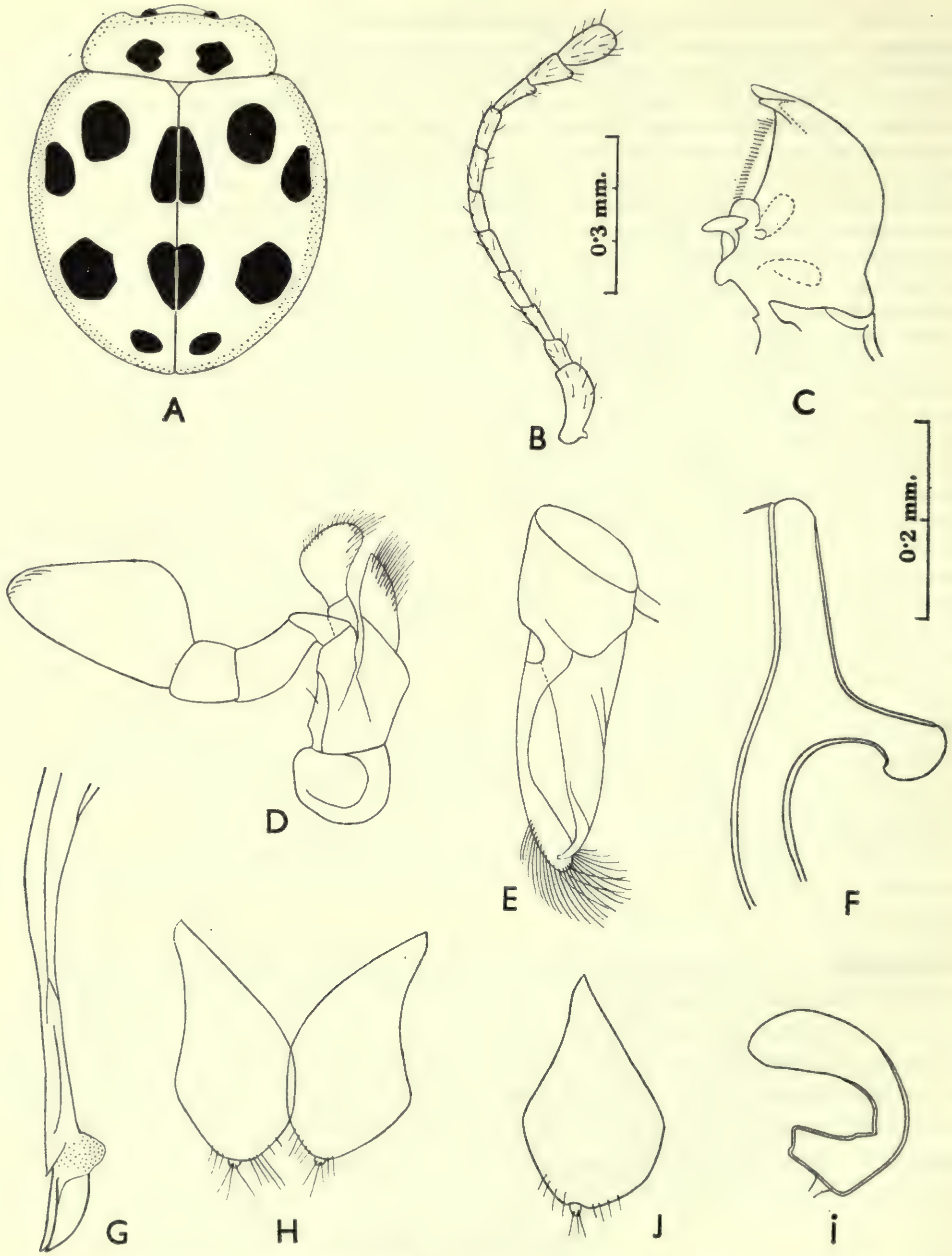

Fig. 17. A, outline showing pattern of *Calvia pinaki*, sp. n. B, C, D, antenna, mandible and maxilla respectively, of the same. E, male genitalia without the sipho of the same, lateral view. F, G, siphonal capsule and apex of the sipho of the same. H, I, female genital plates and spermatheca respectively of *Calvia durgae*, sp. n. J, female genital plate of *Calvia trilochana*, sp. n. (0·3 mm. scale for figs. B–D ; 0·2 mm. scale for figs. E–H and J).

ten black spots of which two, situated at one-third and two-thirds along the suture, are common to both the elytra and are nearly oval in outline ; the other spots on each elytron are as follows : the subhumeral spot subrounded, small to moderately larger, situated in the middle of the elytron just below the level of the humeral callus ; the next spot, similar or slightly smaller, situated near the external margin at about one-third the length of elytra or at level with the first sutural spot ; the postmedian spot also subrounded situated in line with the post-humeral spot and level with the second common or sutural spot, nearly as large or a little larger than the latter ; the subapical spot smallest, rounded, and situated in the apical angle equidistant from the sutural and external margins ; the external border of elytra slightly translucent. Underside testaceous except for the black metathorax and the median parts of the first three abdominal sternites.

Head finely and sparsely punctate. *Pronotum* rather sparsely, finely and shallowly impressed, less so than that in *C. shiva*. *Scutellum* nearly impunctate, with only a few, very fine punctures. *Elytra* with moderately fine, fairly close, impressed and uniform punctation, less coarse than that in *C. shiva* or *C. pasupati* (see infra). *Underside* with the prosternal carinae subparallel, not reaching the anterior margin, both pro- and mesosterna finely and sparsely punctate ; the metasternum with a longitudinal stria extending from the anterior to the basal margin, the punctation fine, moderately impressed and generally sparse, the median part with a few short and shallowly impressed striae. *Male genitalia* (Text-fig. 17, E) similar to those of *C. shiva* except that the basal piece is longer than wide and that the median lobe appears to be narrow when seen in profile ; the apex of the sipho also differs in outline and in the pattern of chitinisation (Text-fig. 17, G). *Female genitalia* with the genital plates more or less like those of *C. durgae* but with the distal half of the inner margin of the two plates subparallel rather than rounded ; spermatheca rather similar to that of the latter species.

Length 4·5 mm.; breadth 3·7 mm.

Holotype. ♂, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (The head with the mouth-parts dissected and the male genitalia mounted between two coverslips and on the same pin as the specimen.)

Allotype. ♀, with the same data as the holotype ; in the Z.S.I. collection. (The female genitalia mounted as above.)

The most distinctive feature in the coloration of this species is that the background colour of the head, pronotum and elytra is testaceous to reddish-testaceous and that there are black pronotal and elytral spots. The differences between this and the preceding species in respect of punctation and genitalia have already been referred to earlier. The antennae and mouth-parts which are typical of the Coccinellini are shown in Text-fig. 17, B–D.

Calvia pasupati sp. n.

(Text-fig. 16D)

♂. Body similar in shape and outline to *C. pinaki*, except that the declivity of the humeral callus is slightly more pronounced. Head straw-yellow except the grey eyes, the testaceous antennae and reddish-testaceous apices of the mandibles. Pronotum (Text-fig. 16, D) for the most part straw-yellow except for a pair of rather large, quadrate, black spots on the base, each at a little distance away from and on either side of the longitudinal median line ; a narrow border along the anterior angles and the lateral margins rather light testaceous and somewhat translucent. Scutellum straw-yellow. Elytra also with the ground colour straw-yellow except a narrow, translucent, testaceous border along the external margins and with twelve black spots arranged more or less as in the preceding species, but differing in shape and size, being much larger than those in *C. pinaki*.

Head with very fine, sparse and shallow punctation. *Pronotum* similar to that in *C. pinaki* in outline but with the punctation fine, moderately sparse and fairly impressed, almost as that in *C. shiva*. *Scutellum* with a couple of fine punctures. *Elytra* as long as the breadth of the two together, with the humeral callus prominent and with the declivity of the callus towards the lateral margin well pronounced for about one-fourth of the length of the margin ; the external margin narrowly expanded along the border and slightly declivous ; the punctation moderately coarse and impressed, distinctly more than in *C. pinaki* and more or less like *C. shiva* which has, however, a rather mixed type of punctation ; in the present species, only a few punctures become coarser towards the lateral margin, otherwise, especially on the disc, they are uniform. *Underside* with the prosternal carinae subparallel and extending up to two-thirds of the length of prosternum, metasternum with a fairly well-impressed, median longitudinal stria and with coarse, sparse and impressed punctures except in the central median area where the punctures are much sparser, very fine and impressed and where the surface is also provided with a few short and shallowly impressed, transverse striae. *Male genitalia* like those in *C. pinaki* but with the median lobe slightly larger, more distinctly chitinized in the longitudinal median part and bent, with a scoop, at an angle of about one hundred degrees, towards the parameres which are comparatively more densely covered with hair than any of the preceding species ; the apical part of sipho also differs, being strongly chitinized and bearing two pairs of elongate, rod-like structures at the apex.

♀. Unknown.

Length 4·75 mm.; breadth 4·0 mm.

Holotype. ♂, SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*), in the British Museum (N.H.), London. (The genitalia dissected and mounted between two coverslips on the same pin as the specimen.)

Paratype. ♂, with the same data as the holotype is in the Z.S.I. collection, Calcutta. This example is apparently immature, and teneral, the coloration being not fully developed because the pronotal and elytral spots are brownish.

Although this species resembles *C. pinaki* in the basic arrangement of the black spots of the elytra it can easily be distinguished from the latter in the detailed characters of the colour-pattern ; the ground colour of the head, pronotum and elytra in this species is straw-yellow as against the brown colour in *C. pinaki*, and the black spots are much larger and different in outline. There are also differences between the two species in the degree of the declivity of the elytra in the area posterior and lateral to the humeral callus, in the punctation of the pronotum, elytra and metasternum, as well as in the shape and structure of the median lobe and sipho of the male genitalia.

Tribe **Psylloborini**

Halyzia straminea (Hope)

Coccinella straminea Hope, *in* Gray, 1831 : 31 [Type loc., Nepal].
Halyzia straminea (Hope) Mulsant, 1850 : 165.
Halyzia straminea (Hope) ; Weise, 1895c : 133.

Material. 2 ex., SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*).

Though originally described from Nepal this species was further recorded from Simla (Punjab) and Sikkim by Weise (1895). An example of it from Kurseong (N. Bengal) is present in the Z.S.I. collection, beside two others from Sikkim.

Halyzia sanscrita Mulsant

Halyzia sanscrita Mulsant, 1853 : 152 [Type loc., N. India].

Material. 1 ex., TIBET, Yatung, 10,000 ft., 23.vii.1924 (*R. W. G. Hingston*); 1 ex., SIKKIM, Singhik, 5,000 ft., 24.iv.1924 (*R. W. G. Hingston*).

The record of this species from Yatung, Tibet, is of great interest as the species has hitherto been known from various parts of northern India and Sikkim only. I have collected it in Delhi where the examples with confluent elytral spots, especially in the apical half of elytra, are quite common.

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THE ACRIDOIDEA (ORTHOPTERA) OF MADAGASCAR
III. PYRGOMORPHIDAE

V. M. DIRSH

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 14 No. 2
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THE ACRIDOIDEA (ORTHOPTERA) OF MADAGASCAR
III. PYRGOMORPHIDAE

BY

V. M. DIRSH X41)

Anti-Locust Research Centre, London

Pp. 49–103 : 29 *Text-figures*

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THE ACRIDOIDEA (ORTHOPTERA) OF MADAGASCAR

III. PYRGOMORPHIDAE

By V. M. DIRSH

SYNOPSIS

The family *Pyrgomorphidae* of Madagascar is revised. Six new genera and eight new species are described. Inadequately described genera and species are redescribed and synonymy checked. Interrelation between genera and species is briefly discussed.

Family **PYRGOMORPHIDAE**

THE family *Pyrgomorphidae* is richly represented in Madagascar. Most of the genera and species are purely endemic and from the taxonomic point of view peculiar. Interrelation of many of them with other genera and species of the family is rather obscure. It seems likely that less than half of the genera and possibly less than a quarter of the species of *Pyrgomorphidae* of Madagascar are known. Further study of the fauna of the island is necessary to produce new data which could help in understanding the interrelationships of this family.

One species (*Caprorhinus squamipennis* Bruner), which is not from Madagascar but Comoro Is., is included in this part as essential for an understanding of the whole genus.

The key to genera below is purely artificial and does not reflect phylogenetic interrelation between the genera.

In this part, the bibliography contains only those references not already given in parts I and II (Dirsh, 1962).

KEY TO GENERA

1 (26) Bases of antennae located behind lateral ocelli. Lower external area of hind femur not displaced ventrally to external medial area γ.

2 (3) Pronotum strongly tuberculate and toothed ; dorsum flattened ; lateral lobes attached to dorsum at a right angle (Text-figs. 1, 2) ***PHYMATEUS*** (p. 52)

3 (2) Pronotum not tuberculate or with small tubercles and without teeth ; dorsum cylindrical, or subcylindrical ; lateral lobes roundly merging with dorsum.

4 (23) Head conical or acutely conical, without process formed by fastigium of vertex and upper part of frons.

5 (12) Elytra fully developed, shortened or vestigial.

6 (7) Lateral carinae of pronotum present (Text-figs. 4, 5) ***PYRGOMORPHELLA*** (p. 57)

7 (6) Lateral carinae of pronotum absent.

8 (11) Elytra shortened, touching each other at dorsum, lobiform lateral, covering tympanum, or fully developed (in f. macroptera).

9 (10) Head narrow, acutely conical ; fastigium of vertex more than twice as long as its width. Metazona of pronotum not raised. Elytra lobiform, lateral or in f. macroptera fully developed (Text-fig. 6) . . . ***RUBELLIA*** (p. 62)

10 (9) Head widely conical ; fastigium of vertex slightly longer than its width. Metazona of pronotum raised or inflated. Brachypterous or micropterous (Text-figs. 7, 8) . . . . ***PSEUDORUBELLIA*** (p. 64)

11 (8) Elytra vestigial, scale-like, not covering tympanum (if present) (Text-fig. 9) ***CAPRORHINUS*** (p. 67)

12 (5) Elytra completely absent.

13 (20) Frontal ridge, in profile, angularly or roundly merging with fastigium of vertex.

14 (15) Head short, conical ; fastigium of vertex wider than its length. Male cercus widened in basal and narrowed and incurved in apical part (Text-fig. 15) ***GYMNOHIPPUS*** (p. 75)

15 (14) Head elongate, narrow conical ; fastigium of vertex longer than its width. Male cercus simple, conical or subconical.

16 (19) Male subgenital plate simple, slightly compressed, in profile with rounded apex.

17 (18) Male body elongated, very cylindrical, in female slightly fusiform. Sides of mesosternal interspace slightly incurved or straight (Text-fig. 16) ***PARASPHENA*** (p. 76)

18 (17) Body, in both sexes, strongly elongated, cylindrical. Sides of mesosternal interspace strongly incurved (Text-fig. 17) . ***DYSCOLORHINUS*** (p. 78)

19 (16) Male subgenital plate from above trilobate, lobes formed by lateral and median carinulae (Text-fig. 18) . . . . . . ***AMBOSITRACRIS*** (p. 80)

20 (13) Frontal ridge, in profile, excised before merging with fastigium of vertex.

21 (22) Body very slender, elongated, narrow cylindrical. Fastigium of vertex strongly elongated, narrow angular, more than twice as long as its width. Antenna longer than head and pronotum together (Text-fig. 19) ***SAGITTACRIS*** (p. 82)

22 (21) Body cylindrical or slightly fusiform. Fastigium of vertex parabolic, less than twice as long or shorter than its width. Antenna shorter than head and pronotum together (Text-fig. 20) . . . . ***PYRGOHIPPUS*** (p. 84)

23 (4) Head conical, with protruding process formed by fastigium of vertex and upper part of frons.

24 (25) Male anterior femur on external side with row of large teeth. End of abdomen not inflated. Cercus simple, conical (Text-fig. 21) . . ***GELOIUS*** (p. 86)

25 (24) Male anterior femur without teeth. End of abdomen inflated. Cercus large, incurved, with wide basal and strongly widened apical part ; apex below with angular projection, above with very large inverse axe-shaped projection (Text-figs. 25, 26) . . . . ***PSEUDOGELOIUS*** (p. 92)

26 (1) Bases of antennae located in front of lateral ocelli. Lower external area of hind femur displaced ventrally to external medial area.

27 (30) Fully winged. Frontal ridge over whole length low, not protruding in apical part and not excised at apex.

28 (29) Lower external area of hind femur strongly widened and displaced ventrally to external medial area (Text-fig. 27) . . . ***SCHULTHESSIA*** (p. 95)

29 (28) Lower external area of hind femur narrow, slightly displaced ventrally to external medial area (Text-fig. 28) . . . ***ATRACTOMORPHA*** (p. 97)

30 (27) Micropterous or apterous. Frontal ridge in apical part compressed and protruding, at apex, in profile, excised (Text-fig. 29) ***UHAGONIA*** (p. 100)

PHYMATEUS Thunberg, 1815

Phymateus (*Maphyteus*) I. Bolivar, 1904 : 403.
Maphyteus I. Bolivar, 1904 ; Kirby, 1910 : 312 ; Dirsh, 1958 : 51.

Large and robust. Integument rugose and tuberculate. Antenna thick, filiform. Fastigium of vertex short, convex, angular ; apical fastigial areolae poorly developed, convex ; fastigial furrow short, deep ; head conical ; frons oblique and incurved ; frontal ridge narrow, sulcate with thick lateral carinulae. Dorsum of pronotum flattened, covered with tubercles and teeth ; median carina low, widely interrupted by three sulci ; metazona shorter than prozona, its posterior margin rounded, with tuberculate or toothed edge ; lateral lobes attached at a right angle. Prosternal process large, acutely conical ; mesosternal interspace longer than its width, distant from transverse metasternal interspace. Elytra and wings fully developed ;

wings brightly coloured, with tessellated pattern. Tympanal organ well developed. Hind femur narrow ; external apical spine of hind tibia present. Arolium large. Male supra-anal plate elongate, angular ; cercus conical ; subgenital plate subconical, obtuse. Ovipositor short, robust, with curved valves.

Phallic complex : cingulum strongly sclerotized ; valves of cingulum short ; penis straight, with slightly curved apex ; basal valve moderately widened, apical valve acute or subacute. Epiphallus robust ; bridge moderately short ; lophi short, with large, strong hooks ; dorsolateral appendices short, stout.

Spermatheca irregularly twisted ; widely vermicular, with single diverticulum ; sometimes there is bulge suggesting presence of second diverticulum.

Type species : *Gryllus Locusta morbillosus* Linnaeus, 1758.

KEY TO SPECIES

1 (2) Elytra from steel-bluish to olive-green, tessellated pattern yellow ; hind wing crimson red . . . . ***saxosus*** Coquerel

2 (1) Elytra from brownish-orange to olive-green, tessellated pattern orange or absent ; hind wings from orange to orange-red . . . ***madagassus*** Karsch

Phymateus saxosus Coquerel, 1861
(Text-figs. 1, 3)

Phymateus saxosus Coquerel, 1861 : 500.
Phymateus puniceus I. Bolivar, 1904 : 415, **syn. n.**
Phymateus buyssoni I. Bolivar, 1903 : 190, **syn. n.**
Phymateus buyssoni var. *spinosus* I. Bolivar, 1904 : 416, **syn. n.**
Phymateus cardinalis I. Bolivar, 1904 : 516, **syn. n.**

♂. Antenna 19-segmented, longer than head and pronotum together. Head above with median carinula.

General coloration steel-bluish ; antenna black ; dorsum of pronotum red, with red spines and tubercles, olive-green or dark brown, with red spines and tubercles, or olive-green, with orange spines and tubercles ; lateral lobes of pronotum and pleura with orange spots ; elytra dark steel-blue, olive-blue or olive-green, with yellow tessellated pattern, which varies, being narrow or wide ; hind wings crimson-red, in newly moulted specimens pale, in sexually mature intensely red ; carinulae of hind femur yellow ; hind tibia olive green, with yellow spines ; abdomen with alternating blackish and yellowish rings.

♀. As the male, but larger and more robust. Antenna 18-segmented. Subgenital plate in middle of posterior margin with narrow angular projection.

Length of body ♂ 43·0–55·0, ♀ 64·0–73·0 ; pronotum ♂ 10·5–13·6, ♀ 12·8–17·3 ; elytron ♂ 41·3–52·4, ♀ 50·4–63·2 ; hind femur ♂ 21·0–27·0, ♀ 24·6–31·2 mm.

The original description of *Phymateus puniceus* I. Bolivar was based on a male and female, and noted that they are preserved in the Paris Museum. At present only a female remains there with labels : (1) " Madagascar. Montagne Amboitrosy. Dr. Joly 1900 "; (2) " Sept."; (3) in I. Bolivar's handwriting : " *Phymateus puniceus* Bol. I. Bolivar det. 1903 ". The word " Syntype " was added by a different hand and different ink. In the Madrid Museum there is a female specimen of *Phymateus puniceus* with I. Bolivar's determination label and with the recently added label " Allotype ".

The male and two female specimens of *Phymateus buyssoni* I. Bolivar are preserved in the Paris Museum, all with labels : " Madagascar. Andevorante, A. Mathiaux.

1900 ". Also on the male is " *Phymateus buyssoni* Bol. Type " in I. Bolivar's handwriting, and on both females the labels " Type " are present but determination labels are absent.

The male specimen of *Phymateus buyssoni* var. *spinosus* I. Bolivar is also preserved

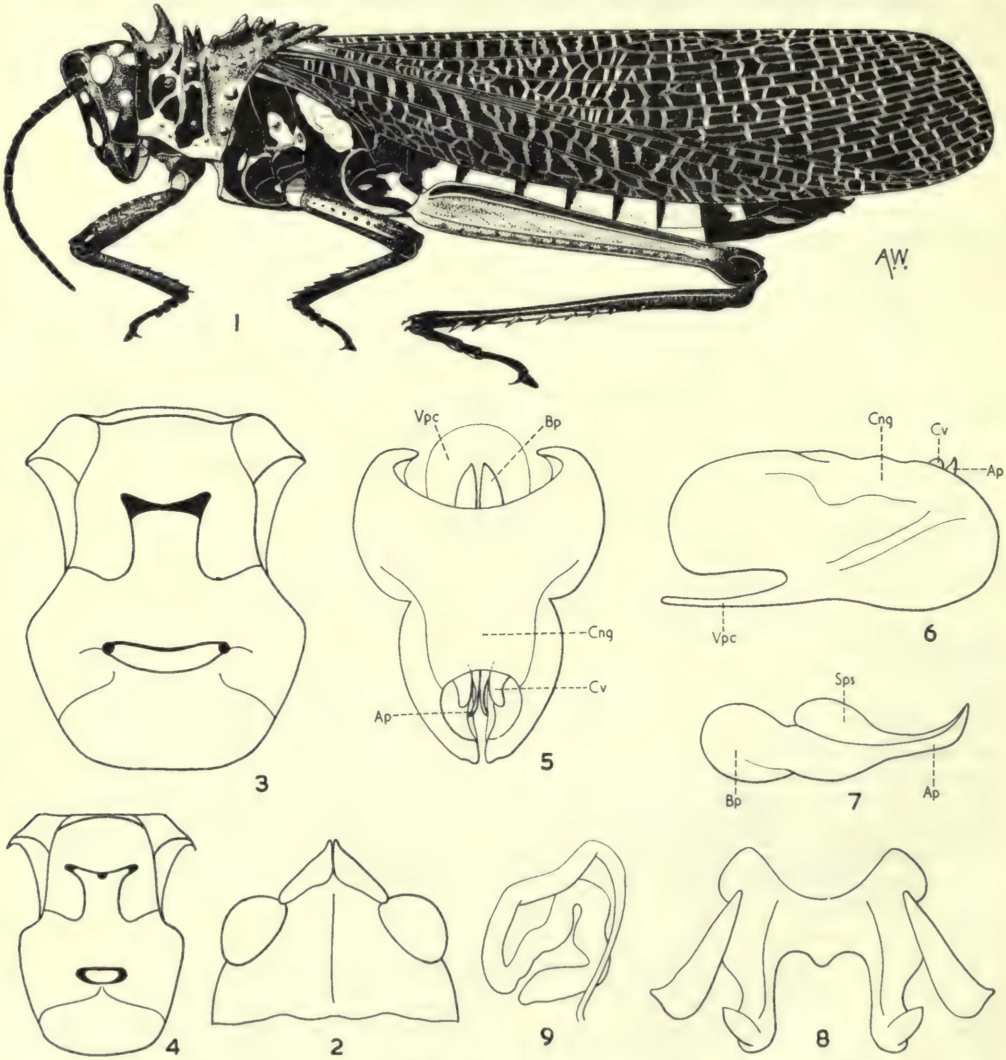

FIG. 1. *Phymateus saxosus* Coquerel, 1861. 1, female. 2, head from above. 3, meso- and metasternum, female. 4, the same, male. 5, phallic complex from above, epiphallus and ectophallic membrane removed. 6, the same, lateral view. 7, penis and spermatophore sac. 8, epiphallus. 9, spermatheca. Ap, apical valve of penis. Bp, basal valve of penis. Cng, cingulum. Cv, valve of cingulum. L, lobe. Scl, sclerotization. Sps, spermatophore sac. Vpc, ventral posterior process of cingulum. (This lettering is applicable to all figures.)

in the Paris Museum. It bears labels : (1) " Madagascar. A. Grandidier 1866 "; (2) " *Phymateus buyssoni* var. *spinosus* Bol. I. Bolivar det. 1903. Type ", in I. Bolivar's handwriting. On the same label the word " Lectotype " was added recently by a different hand and different ink. (3) " Lectotype. Det. D. K. McE. Kevan, 1960 ".

Also in the Paris Museum the male specimen, presumably the type of *Phymateus cardinalis*, is preserved, with labels : (1) " Madagascar. G. Grandidier "; (2) " Mahafaly "; (3) *Phymateus cardinalis* Bol. I. Bolivar det. 1903 ", in I. Bolivar's handwriting. The word " Type " written by a different hand and different ink was added later.

All the above mentioned specimens were studied by me and found conspecific.

I. Bolivar differentiated *Ph. puniceus* from *Ph. cardinalis* by the shape of the pronotum. For *Ph. puniceus* he stated : " Pronotum dorso sensim deplanato ", and for *Ph. cardinalis* " Pronotum dorso postice sensim elevato ". When series of material was studied this difference, originally small, became insignificant, as all intermediate forms were found. Acuteness of the spines of the pronotum is also variable, so that it is impossible to differentiate *puniceus* from *cardinalis* in a long series.

Ph. buyssoni differs only in the orange coloration of the dorsum of the pronotum. In all other respects it is the same as *Ph. puniceus* and *Ph. cardinalis*. *Ph. buyssoni* var. *spinosus* represents only an individual variation of the species, which does not exceed the range of variability of the species in respect of acuteness of spines.

When compared with the type of *Phymateus saxosus* Coquerel, 1861 (in Paris Museum) there is no doubt that it is the same species.

Madagascar Nord-Ouest : Mt. Tsaratanana, Ampanompia, viii.1951, 1 nymph, 1 ♀ (*J. Doucet*) ; Ankarafantsika, 1 ♀.

Madagascar Nord-Est : Station Agricole du Lac Alaotra, 30.xi.1947, 1 ♀ (*J. Doucet*).

Madagascar Ouest : 20 km. Sud Ankavandra, lambeau forestier, 1 ♂ (*R. Paulian*) ; Antsingy de Bekopaka, vii.1949, 1 ♀ (*R. Paulian*).

Madagascar Centre : Tananarive, Tsimbazaza, ix.1958, 1 ♀ ; Nosivola, RN3, 1 ♂ ; Ankazobe, P.K. 132 Rte. de Majunga, ix.1957, 2 ♂ (*J. Elie*) ; dct. de Miarinarivo, Fidasiana, viii.1958, 1 ♂, 1 ♀ (*A. Robinson*) ; Ankazobe, Forêt d'Ambohitantely, 21–23.xii.1947, 2 ♂ ; Arivonimamo, 11.x.1948, 1 ♂ (*R.E.*).

Madagascar Est : Ankadimanga, Manjakandriana, xii.1957, 1 ♂ (*J. Elie*) ; Périnet, 2 ♂ ; Moramanga, 1 ♂ (*Gruvel*) ; Ambinanindrano, 50 km. W. of Mahanoro, 1915, 1 ♂ (*G. K. Kestell-Cornish*) ; Sandrakely, 25 km. Nord Ifanadiana, 3.i.1948, 1 ♀ (*G.V.*) ; Ambatofotirahana, km. 303 Rte. de Mananjary, 2 ♀.

Madagascar Sud-Ouest : Lac Iotry, 40 m., Morombe, vii.1957, 1 ♀ (*A. Robinson*).

Madagascar Sud : Fort Dauphin, Tsivory, Marotsiraka, xi.1959, 1 ♀ (*Randriamasy*) ; Ivohibe, Farafangana, 2 ♂, Forêt, Col d'Ivohibe, xi.1950, 1 ♂ ; Betroka, 18.vi.1948, 1 ♂, 1 ♀ (*J. de D. Ratoto*).

Phymateus madagassus Karsch, 1888
(Text-figs. 2, 3)

Phymateus grandidieri I. Bolivar, 1903 : 190, **syn. n.**

♂. Antenna 19-segmented, longer than head and pronotum together. Head above with median carinula.

General coloration brownish-orange to olive-green ; dorsum of pronotum orange-brown, olive-green, or brown ; spines and tubercles orange, yellowish, brown or reddish ; lateral

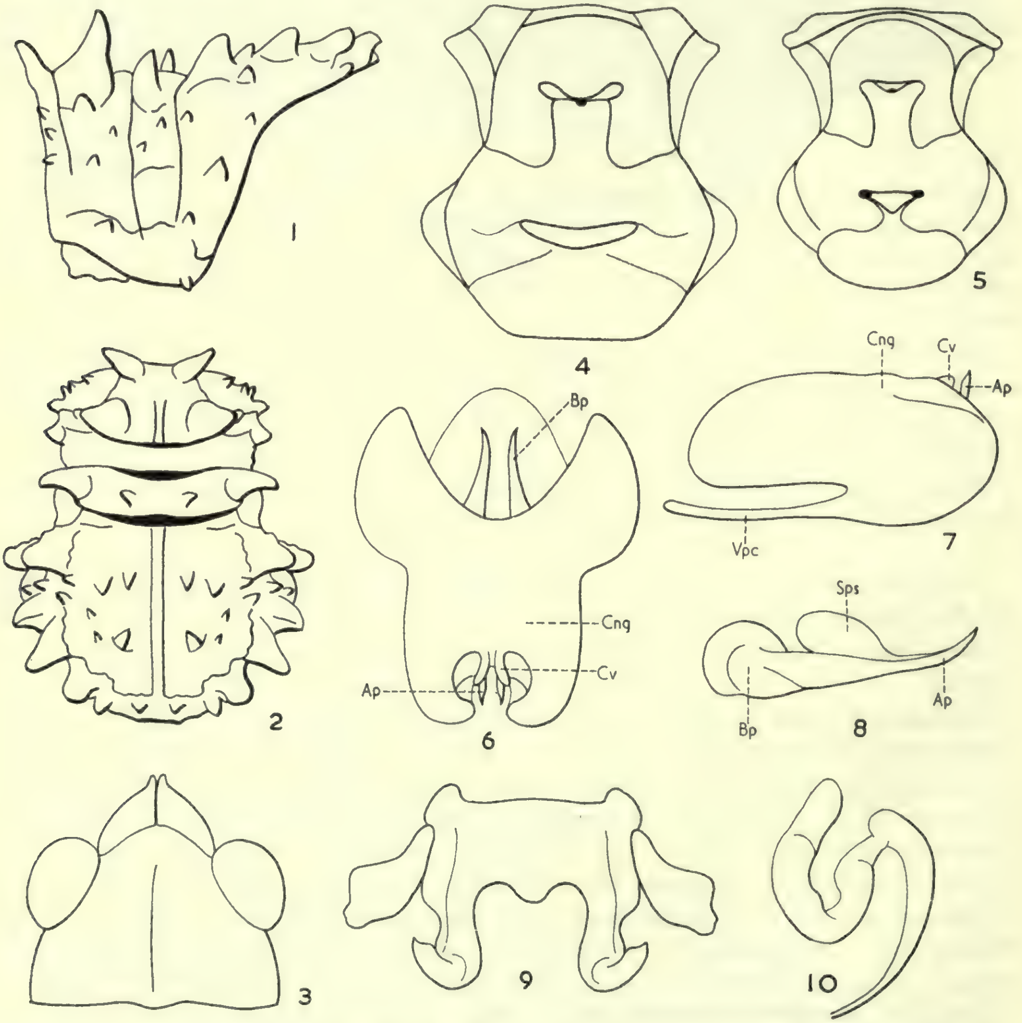

FIG. 2. *Phymateus madagassus* Karsch, 1888. 1, pronotum, lateral view (Type). 2, the same, from above. 3, head from above. 4, meso- and metasternum, female. 5, the same, male. 6, phallic complex from above, epiphallus and ectophallic membrane removed. 7, the same, lateral view. 8, penis and spermatophore sac. 9, epiphallus. 10, spermatheca.

lobe of pronotum and pleura with orange or yellow spots ; elytron brownish-orange or olive-green, tessellated pattern narrow, orange, frequently absent ; hind wing from pale orange to orange and orange-red ; tessellated pattern brownish ; hind femur olive-green or brownish, with yellow carinulae ; hind tibia bluish, spines orange or yellow ; abdomen with alternating yellow and bluish or brownish rings.

♀. As the male, but larger and more robust. Antenna 18 or 19-segmented. Subgenital plate in middle of posterior margin with narrow angular projection.

Length of body ♂ 43·0–51·0, ♀ 55·0–75·0 ; pronotum ♂ 11·4–12·5, ♀ 14·0–18·0 ; elytron ♂ 42·0–44·0, ♀ 49·8–58·5 ; hind femur ♂ 24·0–25·2, ♀ 27·3–30·2 mm.

The type of *Ph. madagassus* Karsch is a female completely discoloured by previous preservation in spirit, but the sculpture of the pronotum is intact. It is in the Berlin Museum and bears the label " Madagascar septentrional, occidental. I. M. Hildebrandt ".

In the Muséum National d'Histoire Naturelle, Paris, there are male and female specimens of *Phymateus grandidieri* I. Bolivar with the labels : (1) " Madagascar, Grandidier 2855–90 "; (2) " *Phymateus grandidieri* Bol. I. Bolivar det. 1903 ", in the handwriting of I. Bolivar ; and (3) " *Phymateus grandidieri* Bol. Syntype. Det. D. K. McE. Kevan, 1960 ". The female bears labels : (1) " Madagascar. G. Grandidier 1899 "; (2) " Tulear, Ambolisatra "; (3) " *Phymateus grandidieri* Bol. I. Bolivar det. 1903 ", in I. Bolivar's handwriting ; and (4) " Lectotype. Det. D. K. McE. Kevan. 1960 ".

Another female specimen of *Phymateus grandidieri* is preserved in the Madrid Museum and labelled " Cotype ".

All the above mentioned specimens were examined by me and found conspecific.

Madagascar Nord : Dct. Diego Suarez, Montagne des Français, ii.1959, 1 ♀ (*A. Robinson*).

Madagascar Sud-Ouest : Besalampy, Ankazoabo, 5 ♂, 9 ♀ ; Sakaraha, Lambomakondro, iii.1956, 3 ♀ (*A. Robinson*).

Madagascar Sud : Fort Dauphin, viii.1948, 1 ♀ (*R. Paulian*) ; Tsivory 16.viii.1948, 3 ♂, 7 ♀ (*R. Paulian*).

The species varies in body size as well as in sculpture of pronotum, which may be represented by very sharp and long spines and numerous tubercles or by comparatively obtuse spines and less prominent tubercles. Coloration varies as described above.

The difference between *Ph. madagassus* and *Ph. saxosus* is mainly in coloration but partly in pattern which in *Ph. saxosus* is more definite. There are no structural differences between these two species which would exceed the range of their variability. Possibly they represent only populations of the same species.

PYRGOMORPHELLA I. Bolivar, 1904

Small or submedium size ; body slightly fusiform. Integument rugose. Antenna thick filiform, compressed at basal part, shorter than head and pronotum together. Fastigium of vertex horizontal, slightly convex, with angular or parabolic apex ; apical fastigial areolae well developed, with well developed marginal carinulae ; carinula of vertex present ; frons strongly oblique and incurved ; frontal ridge narrow, compressed between antennae, with

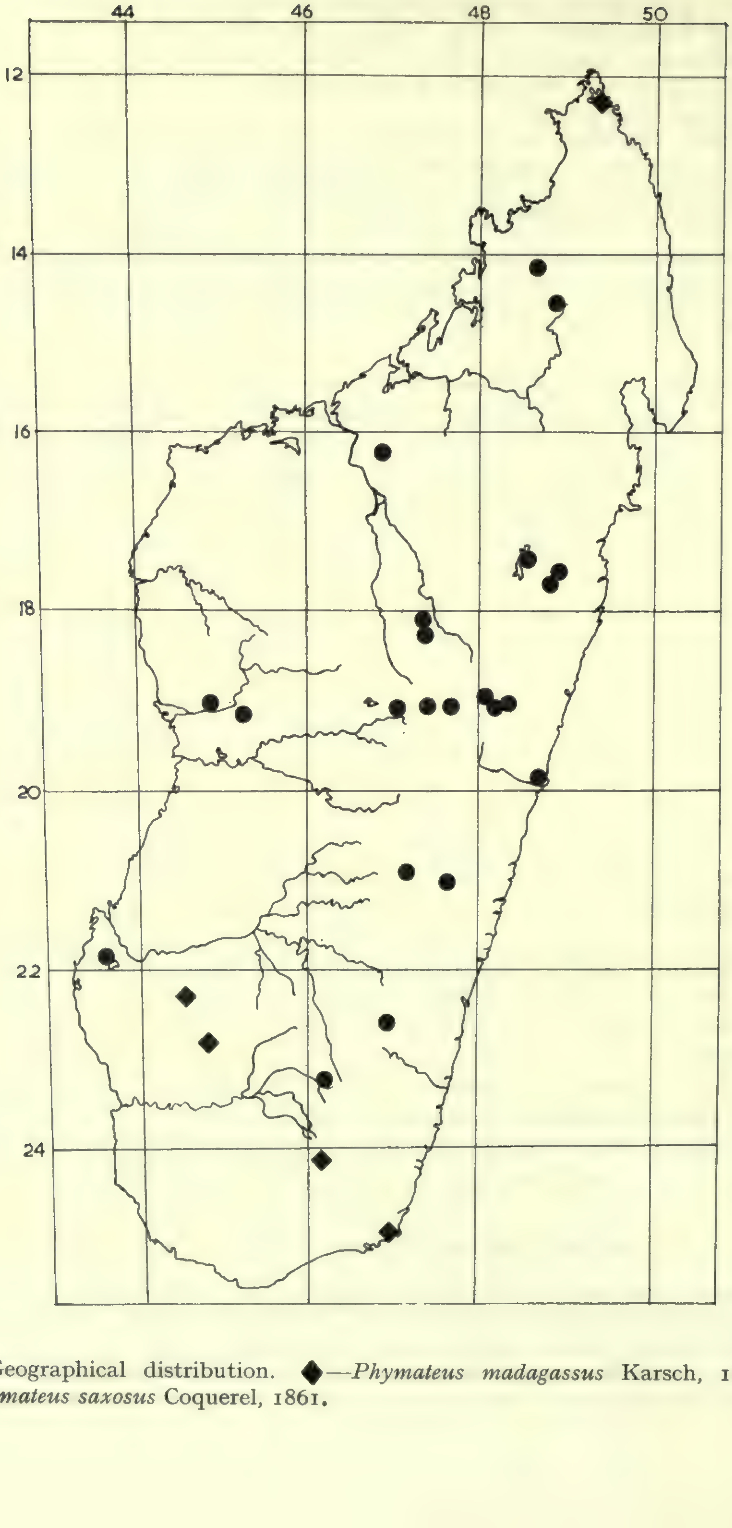
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FIG. 3. Geographical distribution. ◆—*Phymateus madagassus* Karsch, 1888. ●—*Phymateus saxosus* Coquerel, 1861.

slit-like sulcus and sharp carinulae, below with shallow sulcus and low, obtuse carinulae ; row of postocular callosities well developed. Pronotum subcylindrical, strongly tuberculate ; median carina in prozona strong, in metazona sometimes obliterated ; lateral carinae well developed, irregular ; dorsum crossed by two sulci ; metazona about one third to one quarter of length of prozona, its posterior margin in middle roundly or angularly incurved. Prosternal process widely conical in male and collar-like in female. Mesosternal interspace longer than its width, close to metasternal, the two connected by lateral sutures. Elytra vestigial or lobiform. Tympanal organ present or absent. Hind femur slender. External apical spine of hind tibia absent or present. Arolium large. Male supra-anal plate elongate angular. Cercus conical at apex, slightly downcurved. Subgenital plate with rounded apex. Ovipositor moderately long, with curved valves ; lower valve with external, lateral projection.

Type species : *Pyrgomorphella sphenarioides* I. Bolivar, 1904.

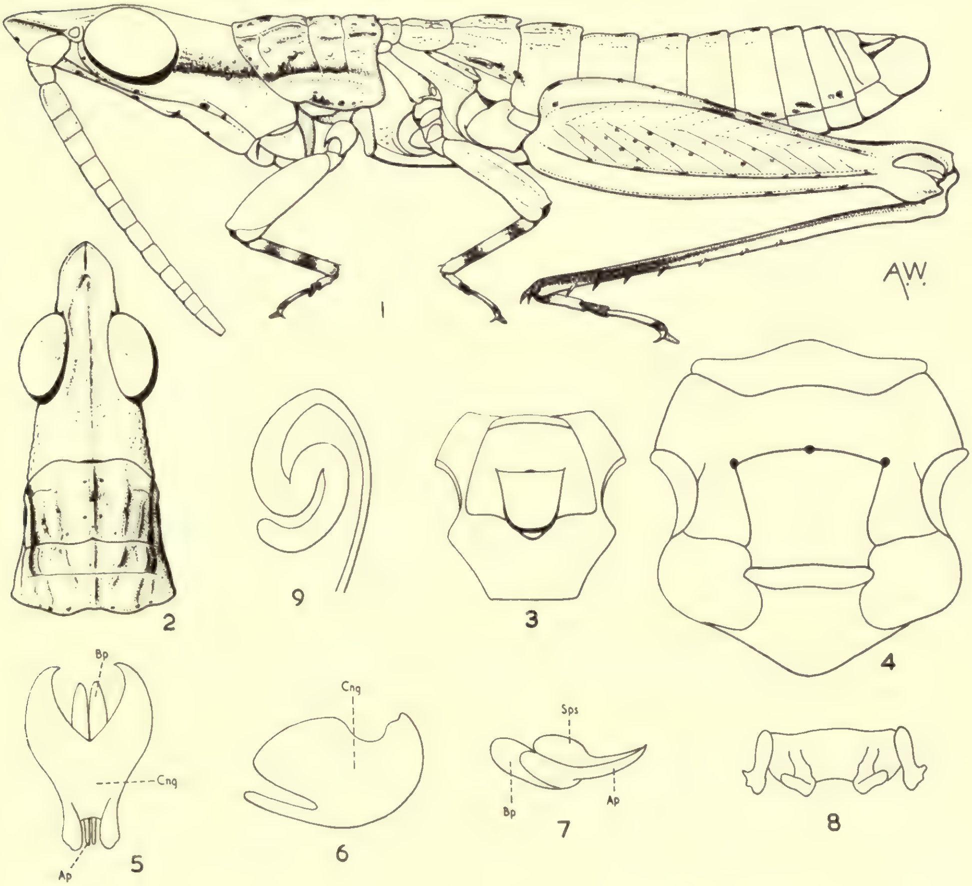

FIG. 4. *Pyrgomorphella minuta* sp. n. 1, male. 2, head and pronotum from above. 3, meso- and metasternum, male. 4, the same, female. 5, phallic complex from above, epiphallus and ectophallic membrane removed. 6, the same, lateral view. 7, penis and spermatophore sac. 8, epiphallus. 9, spermatheca.

***Pyrgomorphella minuta* sp. n.**
(Text-fig. 4)

♂. Type. Small. Integument strongly rugose. Antenna 14-segmented. Fastigium of vertex half again as long as its width, with apex angular ; carinula of vertex strong ; head narrow conical ; frons, in profile, incurved ; compound eyes and ocelli relatively large. Median carina of pronotum strong along whole length ; lateral carinae irregular ; lower margin of lateral lobe oblique and sinuate. Prosternal process collar-like. Mesosternal interspace widening towards anterior end ; metasternal interspace small, close to mesosternal. Elytra vestigial. Wings and tympanal organ absent. Lower lobes of hind knee angular. External apical spine of hind tibia absent.

Phallic complex : cingulum with deep excision at proximal end ; valves of cingulum absent ; basal valve of penis slightly widened ; apical valve short, acute ; spermatophore sac large. Epiphallus with wide bridge ; lophi short, with large, obtuse hooks ; dorso-lateral appendices short, stout, widened at apices.

General coloration greyish-brown ; face, lower part of lateral lobe of pronotum and pleura dirty ochraceous ; hind tibia in apical half blackish.

♀. Larger than male. Antenna 14-segmented. Fastigium of vertex more elongated than in male. Mesosternal interspace relatively wider ; metasternal interspace short, transverse, as wide as mesosternal one. Ovipositor comparatively robust ; subgenital plate with narrow-angular median projection.

Spermatheca with single diverticulum, which is widened and S-Curved.

Length of body ♂ 10·3–10·4, ♀ 16·0 ; pronotum ♂ 1·8–1·9, ♀ 3·0 ; hind femur ♂ 5·0, ♀ 7·0 mm.

Madagascar Sud-Ouest : Beloha, 100 m. Ambovomne, vi.1957, 13 ♂ (including type), 3 ♀ (*Andria R.*).

Type and paratypes in the Paris Museum. 3 ♂, 1 ♀ paratypes in the British Museum (Natural History).

This is the smallest species of the genus so far known. Since the genus *Pyrgomorphella* is rather heterogeneous and badly needs revision, it is possible that the new species represents a new and different genus. Provisionally, however, it is advisable to refer it to *Pyrgomorphella*.

Besides the smaller size of *Pyrgomorphella minuta* it differs from other species of the genus by the more slender and more elongated head, more elongated fastigium of vertex, more developed carinae of pronotum and by the structure of the phallic complex.

***Pyrgomorphella madecassa* I. Bolivar, 1904**
(Text-fig. 5)

♀. Lectotype. Moderately small. Integument moderately rugose. Antenna 13-segmented. Fastigium of vertex with parabolic apex. Dorsum of pronotum rugose ; median carina strong in prozona and weak in metazona ; lateral carinae in prozona sinuate, in metazona excurved; metazona about one third of length of prozona, its posterior margin biarcuate, in middle angularly incurved. Elytron reaching first abdominal tergite, twice as long as its width, with rounded apex ; wing slightly protruding under elytron. Tympanum absent. External apical spine of hind tibia absent. Subgenital plate with slightly excurved apex and angular projection in middle. Spermatheca narrow, S-curved, with single diverticulum.

General coloration olive-green. Postocular callosities ochraceous ; hind wing reddish ; along middle of abdomen a narrow light reddish stripe.

Length of body 18·5–20·5 ; pronotum 3·3–3·5 ; elytra 1·0–1·2 ; hind femur 7·8–8·0 mm.

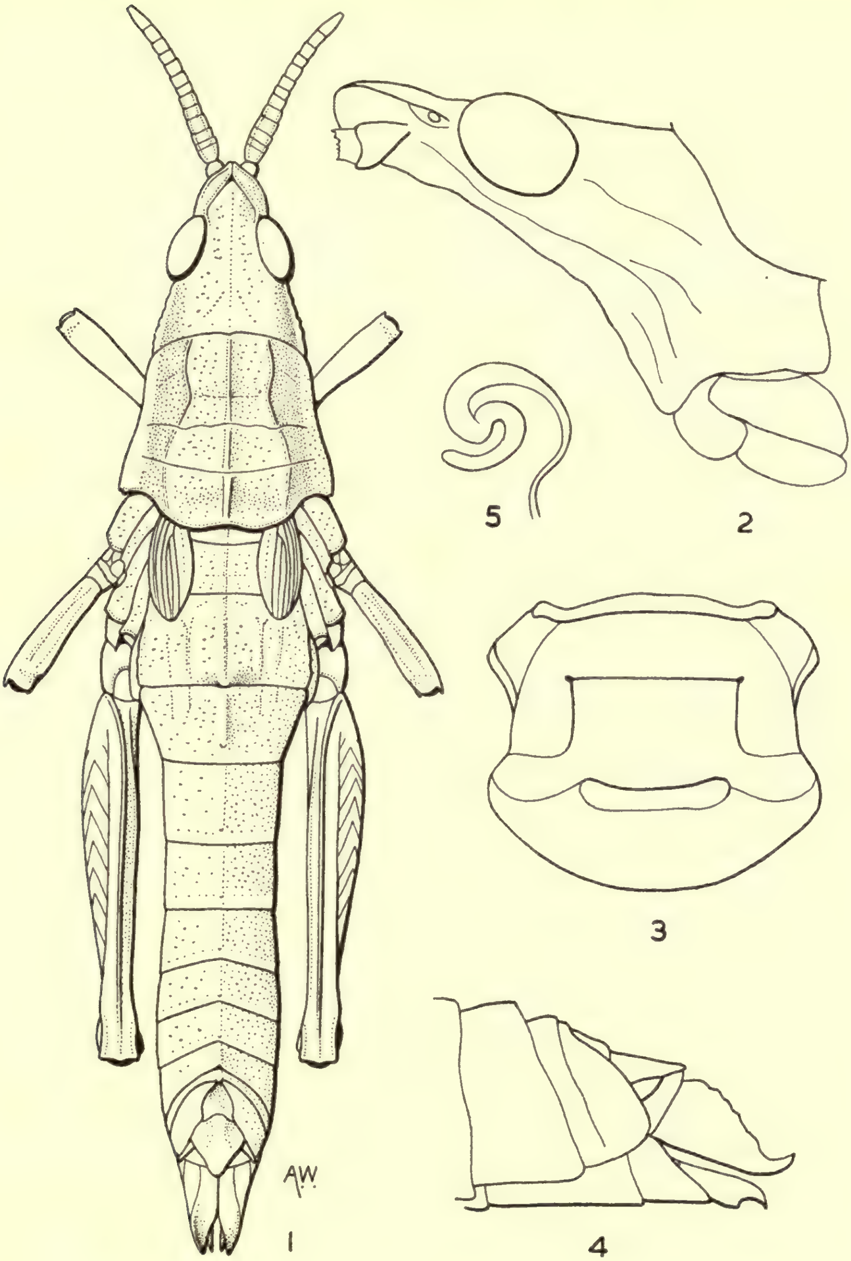

FIG. 5. *Pyrgomorphella madecassa* I. Bolivar, 1904. 1, female. 2, head, lateral view. 3, meso- and metasternum. 4, end of abdomen. 5, spermatheca.

The measurements of the lectotype deviate slightly from those given by I. Bolivar but this may be due to the less accurate instrument used by him.

He described *Pyrgomorphella madecassa* from a male and a female (or males and females) and remarked that the specimens are preserved in the Paris Museum. He does not designate the type. At present, only one female exists in the Paris Museum. The male is probably lost. The female specimen bears labels : " Museum Paris. Madagascar. Grandidier. 1502–92 "; second label in I. Bolivar's handwriting—" *Pyrgomorpha madecassa* Bol. I. Bolivar det. 1903 ". The word " Type " is added on the label later in a different handwriting and in different ink. In all probability this specimen is one on which I. Bolivar's description was based. It is designated here as the lectotype.

Madagascar Centre : Plateau Soaindran, 2,090 m. Andringitra—Ambalavao, 15.i.1958, 1 ♀ (*R. Paulian*). Ambohitantely, Lot. i, 4.ii.1948, 1 ♀ (*P. Cachan*).

Madagascar Sud : Réserve nat. iii, Ambatovositra, Andranomelaza, xii.1956, 1 ♀ ; iii.1956, 1 ♀ (*P. Saga*). Oues du Faux, xii.1951, 1 ♀ (*R. Paulian*).

The small series of female specimens in my possession varies slightly in body size and in general coloration from olive-green to brown. The male is unknown to me.

RUBELLIA Stål, 1875

Of medium size, body fusiform. Integument rugose and tuberculate. Antenna filiform, shorter than head and pronotum together. Head narrow, acutely conical, with longitudinal carinula above ; fastigium of vertex more than twice as long as its width, narrowing forwards with apex rounded, fastigial areolae hardly traceable ; frons strongly incurved ; frontal ridge low, narrow, shallowly sulcate, compressed between and above antennae, roundly merging with fastigium of vertex. Compound eyes moderately small, strongly convex, almost hemispherical. Ocelli large. Pronotum widening backwards, tuberculate ; dorsum slightly flattened, crossed by four sulci ; median carina low, obtuse, lateral carinae absent ; metazona slightly shorter than prozona, its posterior margin widely rounded. Prosternal process low, tubercle-like. Metasternal interspace distant from mesosternal. Elytra and wings strongly shortened, lateral, or fully developed. Tympanal organ well developed. Hind femur narrow, exceeds end of abdomen. External apical spine of hind tibia present. Arolium large. First abdominal tergite of female in middle of posterior part slightly inflated, at posterior margin with tubercle-like projection. In male, second abdominal tergite at anterior margin with transverse invagination. Posterior margin of last abdominal tergite of male deeply excised. Supra-anal plate small, slightly longer than cerci ; cercus small, straight, compressed, angular ; subgenital plate short, with upcurved, attenuate apex. Ovipositor short, robust, with curved valves.

Phallic complex : cingulum widely pear-shaped ; valves of cingulum short, valves of penis curved ; basal valve moderately widened ; apical valve straight. Spermatophore sac large. Epiphallus with short bridge and rounded anterior projections ; lophi short, with large hooks; dorso-lateral appendices short, strongly widened towards apex.

Spermatheca with single, S-curved diverticulum.

Type species : *Rubellia nigrosignata* Stål, 1875.

Rubellia nigrosignata Stål, 1875
(Text-fig. 6)

♂. Antenna 17 or 18-segmented. Integument shiny. Fastigium of vertex at apex widely rounded, its sides undulated ; lateral carinae of frontal ridge low, obtuse. Angles of lateral lobe of pronotum rounded. Mesosternal interspace longer than its width, with deep apical foveolae and slightly incurved sides ; metasternal interspace small, oval. Elytron lobiform, lateral, slightly exceeding first abdominal tergite and covering tympanum, with narrow, slightly upcurved apex, venation strongly reduced, reticulation dense ; wing shorter than elytron. Lower lobes of hind knee on both sides with angular apices. Supra-anal plate short, angular, with parabolic apex.

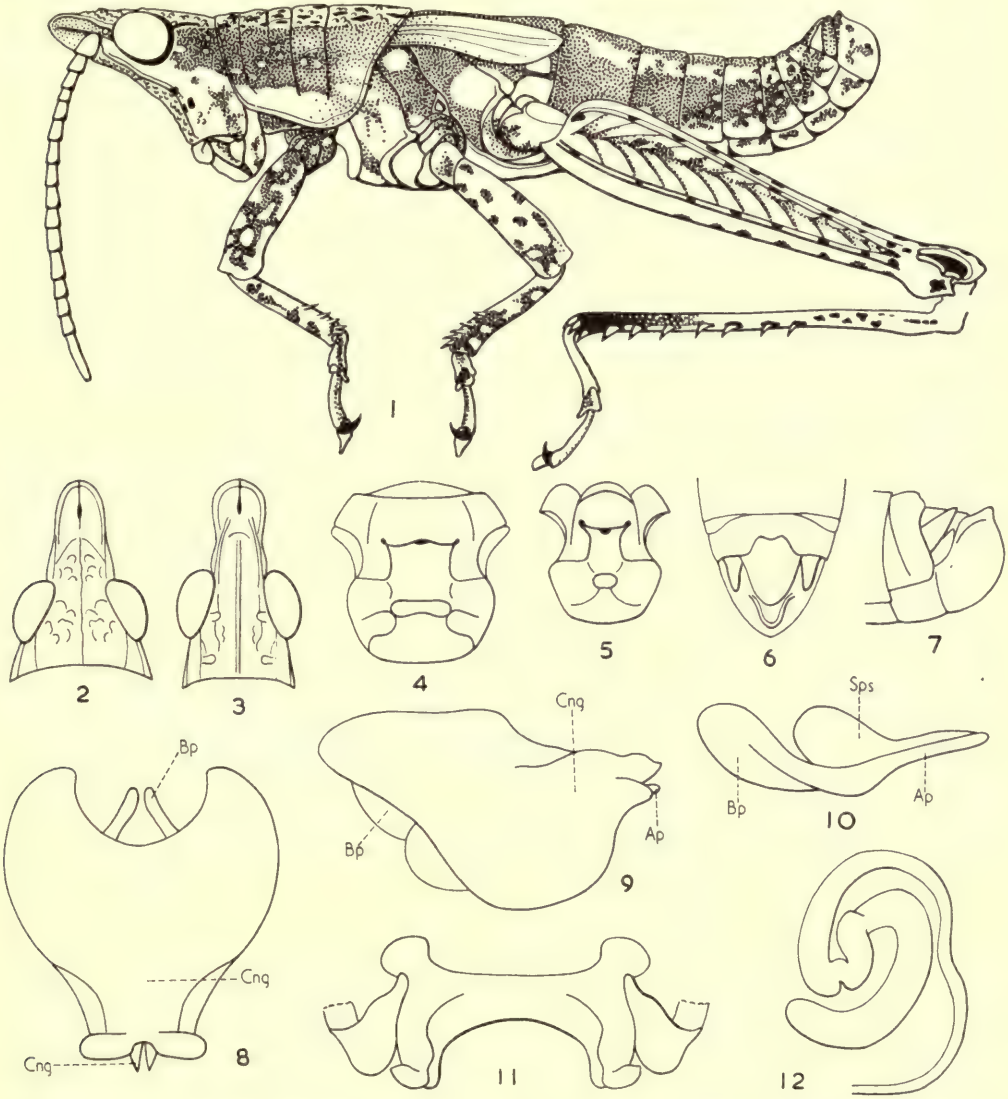

FIG. 6. *Rubellia nigrosignata* Stål, 1875. 1, male. 2, head from above, female. 3, the same, male. 4, meso- and metasternum, female. 5, the same, male. 6, end of male abdomen, from above. 7, the same, lateral view. 8, phallic complex from above, epiphallus and ectophallic membrane removed. 9, the same, lateral view. 10, penis and spermatophore sac. 11, epiphallus. 12, spermatheca.

General coloration yellow or olive yellow, with scattered black spots ; antenna yellow with black rings ; black stripe running from posterior margin of eye, through middle of lateral lobes of pronotum, down to base of hind femur, interrupted by round yellow spots, which are largest at posterior margin of lateral lobe of pronotum and at base of hind femur ; dorsum of pronotum with scattered, small, black spots ; elytron pinkish or greenish ; wing bright red ; all legs yellow with numerous black spots.

♀. Larger than male. Antenna 15 or 16-segmented. Apex of fastigium of vertex rounded, its sides slightly converging forwards. Mesosternal interspace wider than its length, with deep foveolae ; metasternal interspace wide, transverse. Elytra reaching middle of third abdominal tergite. Upper external margin of upper valve of ovipositor slightly, irregularly serrated ; lower valve with angular lateral projection. Posterior margin of subgenital plate with acutangular projection. In other respects as the male.

Forma *macroptera*. Differs by the fully developed elytra and wings, exceeding end of abdomen. This occurs occasionally in both sexes in series of the basic form. No other morphological differences exist.

Length of body ♂ 17·7–25·0, ♀ 27·0–28·5 ; pronotum ♂ 4·2–6·3, ♀ 7·0–7·3 ; elytron (micropterous) ♂ 3·5–5·2, ♀ 7·0–8·1 ; hind femur ♂ 9·3–13·0, ♀ 12·7–13·0 mm.

Rubellia nigrosignata was described by Stål from the male and female. Here the male is designated as the lectotype.

Type locality : " Madagascar ".

Madagascar Nord-Ouest : Andranofasika, Ampijoroa, 1 ♀.

Madagascar Nord-Est : Ile Sainte-Marie, Ambatoroa, v.1959, 1 ♀ (*Razafimandimby*).

Madagascar Centre : Arivonimamo, 10.x.1948, 1 ♂, 1 ♀ (*R.E.*) ; La Mandraka, iii.1954, 2 ♀.

Madagascar Est : Sambava, Réserve nat. XII, Marojejy, Andrakata, ii.1959, 1 ♀ (*P. Soga*), Route de Tamatave, 10.x.1948, 1 ♀ (*P. Cachan*) ; Perinet, iv.1948, 3 ♂, 9 ♀ (*R.F.*) ; Ranomafana, Ifanadiana, 1 ♀ ; Sakavondro, 40 m., Fort Dauphin, vi.1957, 1 ♀ (*A. Robinson*).

Madagascar Sud : Andohahelo, Beroanga, 1 ♂ (*R. Paulian*) ; Androy, Tranomaro, ii. 1954, 1 ♂ (*R. Paulian*); Fort Dauphin, 1 ♂, 1 ♀ (*R. Paulian*); Amborombe. iv.1954, 3 ♀ (*R. Paulian*).

This species varies in body size, particularly the males, and in coloration. Some of the specimens are olive-green and the black pattern is less distinct.

PSEUDORUBELLIA gen. n.

Of medium size, body slightly fusiform. Integument finely rugose. Antenna filiform, longer than head and pronotum together. Head conical, above with longitudinal carinula ; fastigium of vertex slightly longer than its width, narrowing towards apex ; fastigial areolae hardly traceable ; frons moderately incurved ; frontal ridge low, narrow, shallowly sulcate, angularly merging with fastigium of vertex. Compound eyes moderately small, strongly convex, almost hemispherical. Ocelli moderately small. Pronotum widening backwards, dorsum convex, crossed by three sulci, median carina obtuse along whole length or raised in metazona ; lateral carinae absent ; metazona shorter than prozona, slightly raised or raised and inflated, its posterior margin roundly excurved. Prosternal process low, pyramidal. Metasternal interspace distant from mesosternal. Elytra and wings lobiform, lateral or shortened, reaching fifth abdominal tergite and overlapping on dorsum. Tympanal organ well developed. Hind femur moderately narrow. External apical spine of hind tibia present. Arolium large. Ovipositor short, slender with valves slightly curved at apices.

Type species : *Rubellia brancsiki* I. Bolivar, 1904.

I. Bolivar described *Rubellia brancsiki* from a single male specimen, and a new species based on females is described below. Studying the types led to the conclusion that it is not possible to regard either species as congeneric with *Rubellia nigrosignata* and the new genus is erected for them.

The two genera differ as follows :

1 (2) Body fusiform. Integument rugose and tuberculate. Head narrow, acutely conical ; fastigium of vertex more than twice as long as its width ; frons strongly incurved. Dorsum of pronotum flattened ; metazona not raised. Prosternal process tubercle-like. Micropterous or macropterous **RUBELLIA**.

2 (1) Body slightly fusiform. Integument finely rugose. Head widely conical ; fastigium of vertex slightly longer than its width ; frons moderately incurved. Dorsum of pronotum cylindrically convex ; metazona raised or inflated. Prosternal process pyramidal. Micropterous and brachypterous. **PSEUDORUBELLIA**

No doubt a study of the phallic complex would provide more definite characters for the separation of these genera, but unfortunately the end of the abdomen of Bolivar's male type is broken and lost and there are no more male specimens known. However, the general appearance of the new genus is so strikingly different that to keep them together would lead to confusion.

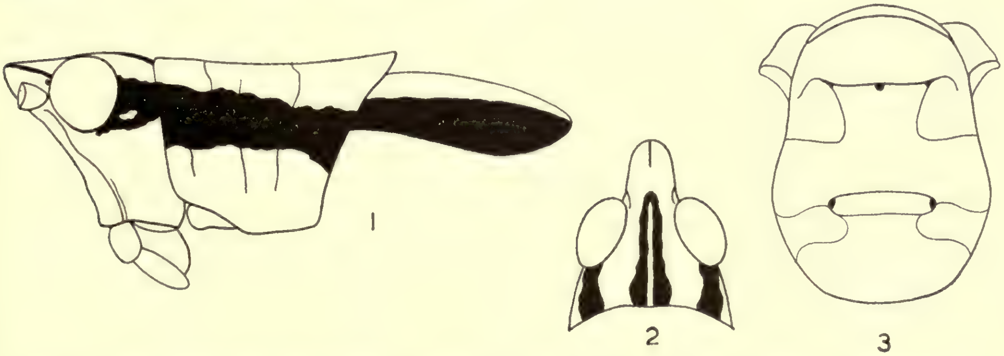

FIG. 7. *Pseudorubellia brancsiki* (I. Bolivar, 1904), type. 1, head, pronotum and elytron, lateral view. 2, head from above. 3, meso- and metasternum.

KEY TO SPECIES

1 (2) (♂) Metazona of pronotum slightly raised, median carina low over whole length. Posterior angle of lateral lobe of pronotum rounded. Elytra lobiform, lateral . . . . **brancsiki** I. Bolivar

2 (1) (♀) Metazona of pronotum inflated, median carina raised. Posterior angle of lateral lobe of pronotum angular, attenuate and slightly excurved. Elytra shortened, overlapping on dorsum . . . . . . **thoracica** sp. n.

Pseudorubellia brancsiki (I. Bolivar, 1904)
(Text-fig. 7)

♂. Type. (Redescription.) Of medium size. Integument shiny. Antenna 18-segmented. Apex of fastigium of vertex parabolic ; fastigial furrow short ; lateral carinae of frontal ridge low, obtuse. Median carina of pronotum low, obtuse over whole length ; metazona slightly raised ; angles of lateral lobes rounded. Mesosternal interspace wider than its length, slightly widened forwards ; metasternal interspace short, strongly widened, transverse. Elytron lobiform, lateral, covering tympanum, slightly exceeds first abdominal tergite and narrowing towards subacute apex. Wings vestigial. Lower lobes of hind knee angular. General coloration olive-green ; antenna brownish ; head orange-yellow, above with blackish longitudinal stripe ; blackish postocular stripe present, enclosing a small yellowish spot ; labrum black, with yellow spots ; pronotum olive-green ; upper part of lateral lobe with blackish longitudinal stripe ; thorax with black and yellow spots ; anterior half of elytron blackish, posterior half greenish ; abdomen above with narrow yellowish median stripe ; legs olive green ; hind knee blackish ; hind tibia and spines blackish.

Length of body 27·0 ; pronotum 6·5 ; elytron 6·0 ; hind femur 14·0 mm.

Only the male type in Madrid Museum is known. The end of the abdomen of the type is broken.

Type locality : Madagascar, Diego Suarez.

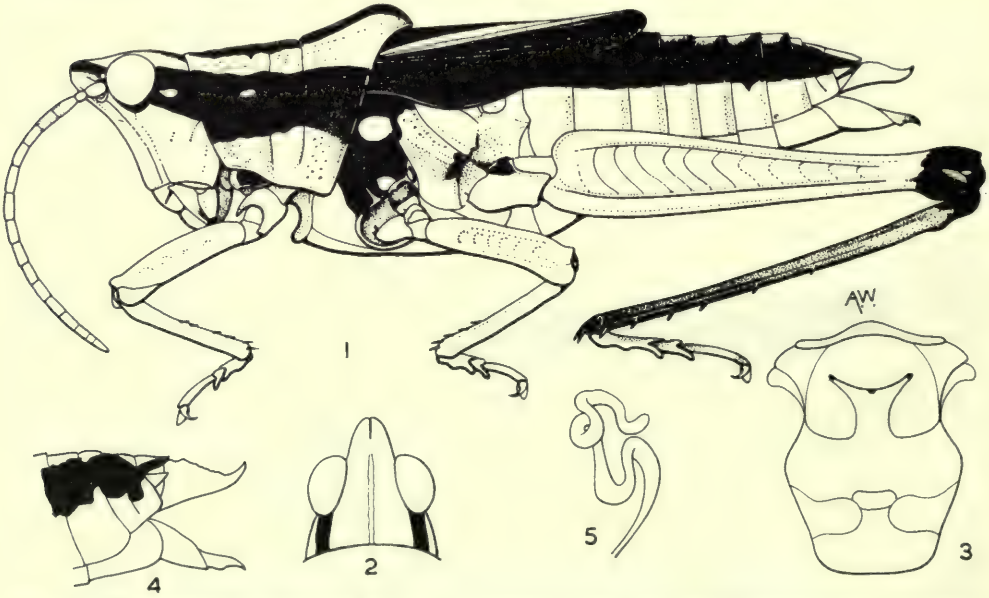

FIG. 8. *Pseudorubellia thoracica* sp. n. 1, female, type. 2, head from above. 3, meso- and metasternum. 4, end of abdomen. 5, spermatheca.

***Pseudorubellia thoracica* sp. n.**
(Text-fig. 8)

♀ Type. Of medium size. Integument shiny. Antenna 18-segmented. Apex of fastigium of vertex angular ; fastigial furrow short ; lateral carinae of frontal ridge low, obtuse. Metazona of pronotum in posterior part inflated, forming near posterior edge a tubercle-like projection, median carina raised, posterior angle of lateral lobe of pronotum slightly attenuate and excurved. Mesosternal interspace longer than its width, with strongly incurved sides ; metasternal interspace short, more or less oval in shape. Elytra exceed middle of fourth abdominal tergite, overlapping on dorsum, venation and reticulation rough, reduced. Wings slightly shorter than elytron. Lower lobes of hind knee angular. Supra-anal plate simple, angular ; cercus short, compressed, narrow angular ; subgenital plate in middle of posterior margin with acutangular projection ; upper margins of upper valve of ovipositor slightly serrated. Spermatheca with single twisted diverticulum.

General coloration ochraceous-brown ; antenna brownish ; head olive-ochraceous ; edges of fastigium of vertex and postocular stripe black, the latter enclosing a small yellowish spot ; prozona of pronotum in posterior two thirds with blackish spot ; median carina in metazona blackish ; lateral lobe, in upper part, with blackish longitudinal stripe ; pleura ochraceous with black spot enclosing yellowish small spot ; elytron bluish-black with ochraceous stripe in vannal fold ; wing bluish ; hind femur ochraceous ; hind knee blackish ; hind tibia olive-green. Male unknown.

Length of body 25·6–29·5 ; pronotum 7·0 ; elytron 8·5–9·2 ; hind femur 14·0–15·0 mm.

Madagascar Nord-Ouest : Ampijoroa, 170 m. Ankarafantsika, i.1957, 1 ♀ (type). Ampijoroa, Tsaramandroso, 1 ♀. Morondava, fôret sud de Befasy, i.1956, 1 ♀ (*R. Paulian*). Type and one paratype in Paris Museum. One paratype in the British Museum (Natural History).

There is a possibility that *Pseudorubellia thoracica* represents the female of *Pseudorubellia brancsiki*. They are, however, so different in many respects that for the time being it is advisable to consider them as separate species.

CAPRORHINUS Saussure, 1899

Of medium size, body fusiform. Integument finely rugose. Antenna thick filiform, or slightly widened in basal part, shorter or longer than head and pronotum together. Head acutely conical ; fastigium of vertex elongated, with parabolic or angular apex ; fastigial areolae poorly developed ; weak carinula of vertex present ; frons in profile strongly incurved ; frontal ridge narrow, low, shallowly sulcate, with low, obtuse lateral carinulae, between and in front of antennae lamelliformly compressed and sulcus deepened. Eye small, oval, strongly convex. Pronotum subcylindrical, slightly constricted in middle and slightly widening backwards ; weak median carina present, lateral carinae absent ; dorsum crossed by two sulci ; metazona much shorter than prozona, its posterior margin angularly or roundly incurved ; lower margin of lateral lobe oblique. Prosternal process low, pyramidal. Mesosternal interspace narrow, in male twice or more as long as its width. Elytra vestigial, scale-like. Tympanal organ in male small, open, or vestigial, in female vestigial. Male abdomen, between first and second tergite, with short, narrow slit. In female metanotum and first abdominal tergite inflated, in middle with large projection, protruding upwards and partly backwards, tooth-like, with soft integument. Hind femur moderately narrow ; lower lobes of hind knee slightly attenuate, angular. External apical spine of hind tibia present. Arolium large. Supra-anal plate in male small, narrow ; in female large, angular. Male cercus moderately long, compressed, in- and downcurved in apical half ; in female short, compressed, angular. Male subgenital plate short, in profile with rounded or straight apex, slightly protruding upper part and pair of lateral tubercles near apex in upper part ; in female slightly trilobate with acutangular middle lobe. Ovipositor short, robust, with valves curved at apices.

Phallic complex : cingulum strongly sclerotized, from above pear-shaped ; valves of cingulum moderately large ; basal valve of penis expanded, up- and excurved ; apical valve narrow, simple, with subacute apex, spermatophore sac large. Epiphallus of variable shape.

Spermatheca with single, vermicular diverticulum.

Type species : *Caprorhinus fusiformis* Saussure, 1899.

Five species of this genus are known at present, four of them from Madagascar and one from Comoro Is. Males are known for all of them, but females only for three.

In general appearance all the species are rather similar, but differ in the shape of the fastigium of the vertex, in the external parts of the genitalia and especially in

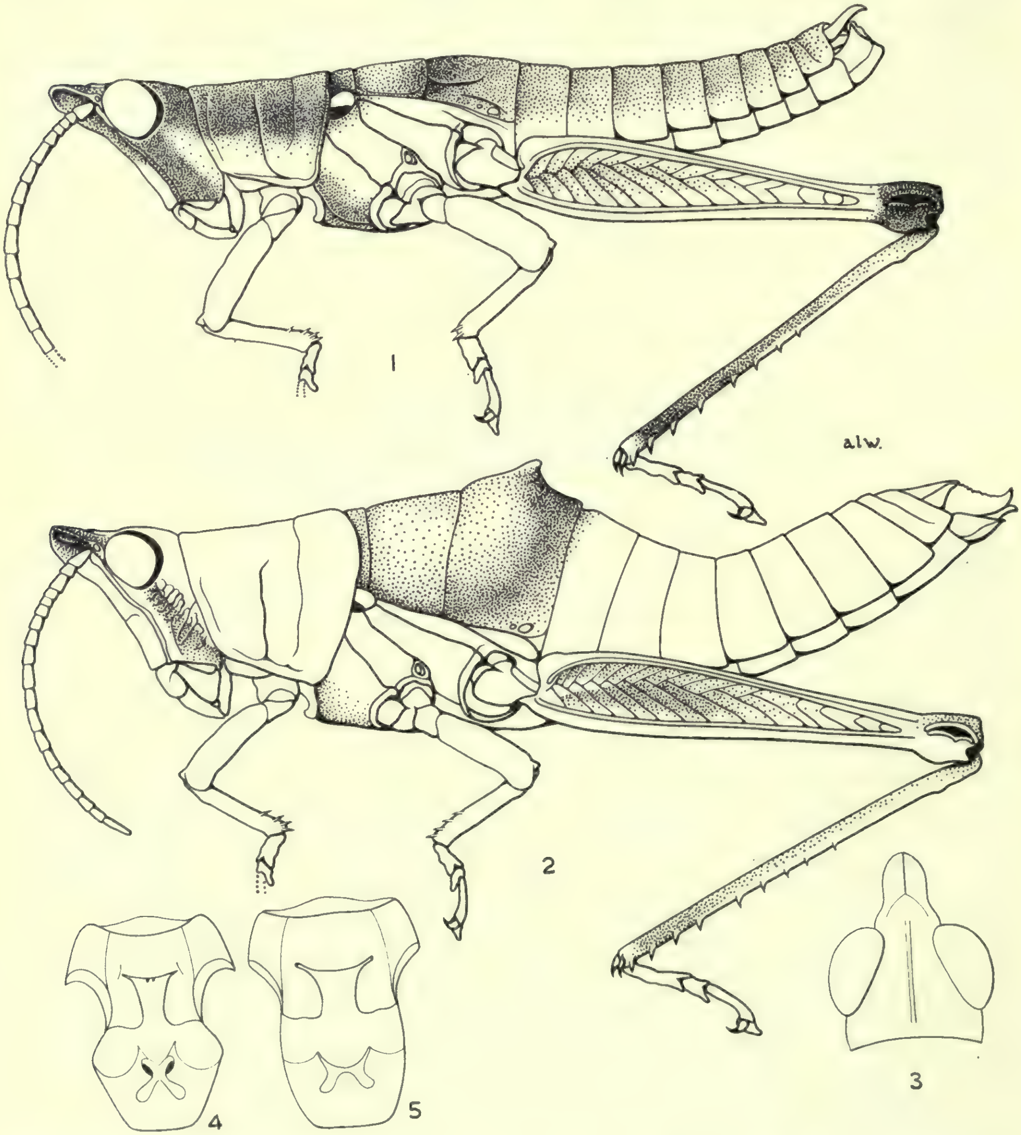

FIG. 9. *Caprorhinus zolotarevskyi* Uvarov, 1929. 1, male. 2, female. 3, head above, male. 4, meso- and metasternum, male. 5, the same, female.

the phallic complex. It should be pointed out that the three known females of three species are so similar in appearance that they may be easily confused.

By the peculiar structure of the first abdominal tergite in females, *Caprorhinus* is rather isolated from the other genera of the family. However, a certain similarity in general appearance (except the projection on the first abdominal tergite in females) and in the phallic complex between *Caprorhinus* and the Indian genus *Colemania* I. Bolivar, 1910 suggests that these genera may be remotely related or at least affinity between them is more pronounced than between *Caprorhinus* and other genera.

KEY TO SPECIES

Males

1 (2) Sides of fastigium of vertex above, in basal part, strongly excurved. Posterior margin of last abdominal tergite sinuate (Text-figs. 9, 10) **zolotarevskyi** Uvarov

2 (1) Sides of fastigium of vertex above, in basal part, moderately or slightly excurved. Posterior margin of last abdominal tergite bilobate or excised in middle.

3 (4) Fastigium of vertex long and narrow. Posterior margin of pronotum deeply, roundly excised (Text-fig. 11). . . . . . . **rostratus** Uvarov

4 (3) Fastigium of vertex relatively shorter and less narrow. Posterior margin of pronotum slightly, widely incurved.

5 (8) Elytron as long as or shorter than its width. Larger size.

6 (7) Fastigium of vertex twice as long as its width at the middle. Cercus more robust. Larger size (Text-fig. 12) . . . . . **fusiformis** Saussure

7 (6) Fastigium of vertex three times as long as its width at the middle. Cercus less robust. Smaller size (Text-fig. 13) . . . . . . **minor** Uvarov

8 (5) Elytron longer than its width. Small size (Text-fig. 14) . **squamipennis** Bruner

Caprorhinus zolotarevskyi Uvarov, 1929

(Text-figs. 9, 10)

♂ Type. (Redescription.) Comparatively large. Integument moderately rugose. Fastigium of vertex twice as long as its width in middle, its sides at basal part strongly excurved, sides of upper part parallel, apex parabolic ; upper, compressed part of frontal ridge narrow, angularly merging with fastigium of vertex. Median carina of pronotum weak ; metazona one third of length of prozona, its posterior margin angularly incised in middle. Prosternal process with subacute apex. Protruding part of elytron about as wide as its length. Tympanal organ small, open. Last abdominal tergite large, its posterior margin slightly protruding, incurved in middle. Supra-anal plate small, angular, shorter than cercus ; cercus compressed, widened in basal part, tapering towards apical part, apex acute, incurved and downcurved ; subgenital plate with lateral ridge-like fold ending in upper part with small tubercle.

Phallic complex : valves of cingulum of moderate size ; penis valves almost straight ; basal valve widened and slightly excurved ; apical valve slightly upcurved, slender. Epiphallus with wide bridge and moderately large anterior projection ; lophi short, robust, with strong hooks ; dorso-lateral appendices as long as epiphallus with club-like apices.

General coloration brown ; face ochraceous ; head with postocular stripe, head and pronotum above with median ochraceous stripe ; lower part of lateral lobe ochraceous ; elytron bright red, its lower external part black ; hind knee brown ; kind tibia brown, with purplish tinge ; spines ochraceous with brown apices.

♀. Larger than the male and more robust. Metanotum and first abdominal tergite inflated ; projection on first abdominal tergite large, compressed, with angular apex. Tympanal organ vestigial. Valves of ovipositor short, robust ; upper external margin of upper valve roughly serrated. Spermatheca vermicular, with single diverticulum. General coloration olive brown. In other respects as the male.

Length of body ♂ 29·0, ♀ 33·0 ; pronotum ♂ 4·5, ♀ 5·0 ; hind femur ♂ 14·5, ♀ 14·0 mm.

Type locality : S.E. Madagascar, between Bazaka and Tongolory, Tuléar. Type in British Museum (Natural History).

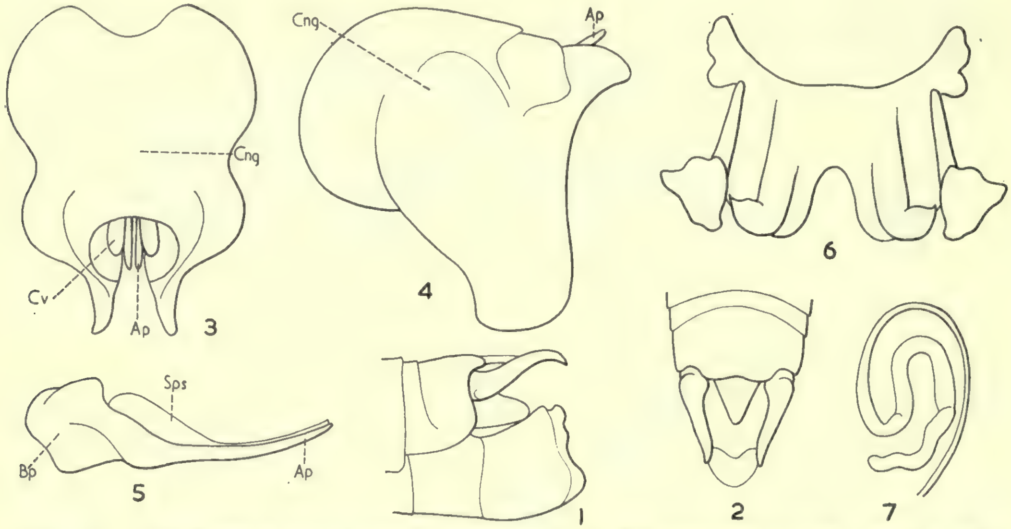

FIG. 10. *Caprorhinus zolotarevskyi* Uvarov, 1929. 1, end of male abdomen, lateral view. 2, the same, from above. 3, phallic complex from above, epiphallus and ectophallic membrane removed. 4, the same, lateral view. 5, penis and spermatophore sac. 6, epiphallus. 7, spermatheca.

Caprorhinus rostratus Uvarov, 1929
(Text-fig. 11)

♂ Type. (Redescription.) Comparatively large. Integument finely rugose. Antenna 21-segmented, apical segment at apex slightly incised. Fastigium of vertex narrow, elongated, three times as long as its width in middle, its sides at basal part slightly excurved, in apical two thirds parallel, apex parabolic ; upper, compressed part of frontal ridge narrow, acutangularly merging with fastigium of vertex. Median carina of pronotum hardly traceable ; metazona one fourth of length of prozona, its posterior margin in middle deeply, roundly incurved. Prosternal process short with subacute apex. Protruding part of elytron longer than its width. Tympanal organ small, open. Last abdominal tergite large, its posterior margin shallowly trilobate. Supra-anal plate small, narrow, shorter than cerci, with obtuse apex ; cercus compressed, widened in basal part, slightly incurved and downcurved in apical part, apex acute ; subgenital plate slightly compressed, in profile almost square.

Phallic complex : valves of cingulum large ; valves of penis straight ; basal valve widened, apical valve straight, slender. Epiphallus with very large bridge and moderately large anterior projections ; lophi shorter than bridge, comparatively narrow, with large hooks ; dorso-lateral appendices short, with excurved, club-like apices.

General coloration brownish-ochraceous ; elytron red, its anterior external part black ;

crescent of hind knee brown ; hind tibia with lower side greenish, upper side brownish ; spines ochraceous, with brown apices. Female unknown.

Length of body 28·0 ; pronotum 4·0 ; hind femur 14·0 mm.

Only male type is known.

Type locality : S.E. Madagascar, Vohimarina, Tongolory, Tuléar. Type in British Museum (Natural History).

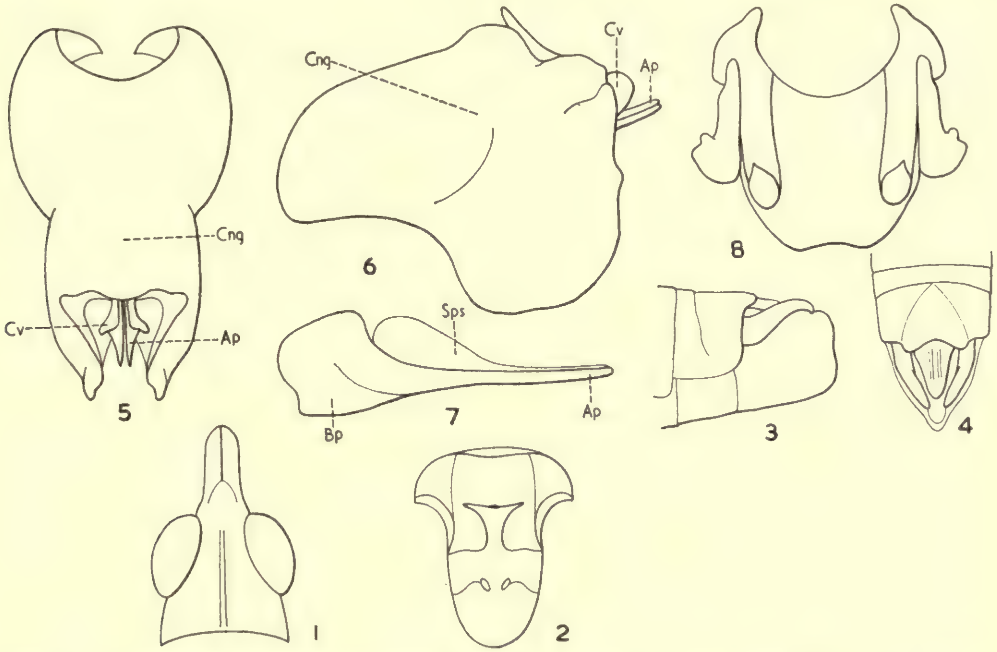

FIG. 11. *Caprorhinus rostratus* Uvarov, 1929. ♂ type. 1, head from above. 2, meso- and metasternum. 3, end of abdomen, lateral view. 4, the same, from above. 5, phallic complex from above, epiphallus and ectophallic membrane removed. 6, the same, lateral view. 7, penis and spermatophore sac. 8, epiphallus.

Caprorhinus fusiformis Saussure, 1899
(Text-fig. 12)

♂ Type. (Redescription.) Comparatively large. Integument rugose. Fastigium of vertex twice as long as its width in middle, its sides at base moderately excurved, sides of its apical two thirds parallel, apex parabolic ; upper, compressed part of frontal ridge moderately high, angularly merging with fastigium of vertex. Median carina of pronotum hardly traceable ; metazona less than half length of prozona, its posterior margin widely and very slightly incurved. Prosternal process with subacute apex. Protruding part of elytron slightly wider than its length, rounded. Tympanal organ small, open. Last abdominal tergite large, its posterior margin shallowly bilobate, shallowly incurved in middle ; supra-anal plate small, angular, shorter than cerci ; cercus compressed, with comparatively wide basal part, tapering towards apex, strongly incurved and slightly downcurved at apical part, apex obtuse. Subgenital plate with lateral, ridge-like formation ending in upper part with small tubercle.

Phallic complex : valves of cingulum comparatively large ; penis valves angularly curved in middle ; basal valve widened and slightly excurved ; apical valve curved and comparatively robust. Epiphallus with comparatively wide bridge, and large almost square anterior projections ; lophi wide, short, with large hooks ; dorso-lateral appendices short, robust, curved, with club-like apices.

General coloration brownish (specimen discoloured by previous preservation in spirit) ; basal external part of elytron black, rest of elytron probably was red ; internal and external crescents of hind knee blackish.

Length of body 28·0 ; pronotum 5·5 ; elytron 1·1 ; hind femur 15·2 mm.

" Madagascar ". Only the type is known.

It was believed that the type of this species was lost, but it has been discovered by Dr. D. Keith McE. Kevan (1962) in the Paris Museum.

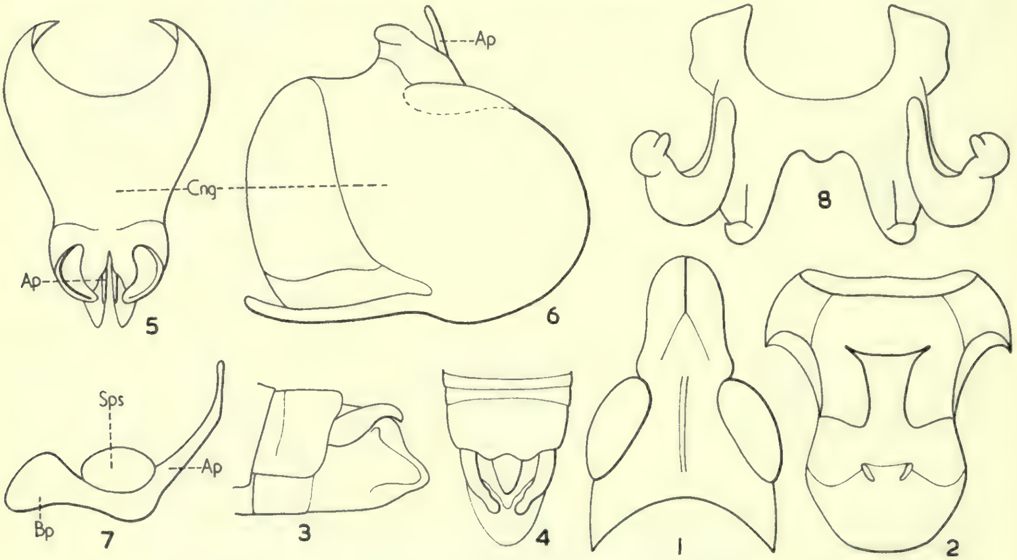

FIG. 12. *Caprorhinus fusiformis* Saussure, 1899. ♂ type. 1, head from above. 2, meso- and metasternum. 3, end of abdomen, lateral view. 4, the same, from above. 5, phallic complex from above, epiphallus and ectophallic membrane removed. 6, the same, lateral view. 7, penis and spermatophore sac. 8, epiphallus.

Caprorhinus minor Uvarov, 1929
(Text-fig. 13)

♂ Type. (Redescription.) Comparatively small. Integument finely rugose. Fastigium of vertex three times as long as its width in middle, its sides at basal third moderately excurved, in apical two thirds slightly convergent, apex angular. Upper, compressed part of frontal ridge narrow, acutangularly merging with fastigium of vertex and slightly excised in apical part. Median carina of pronotum weak. Metazona less than one third length of prozona, its posterior margin slightly incurved. Prosternal process with subacute apex. Protruding part of elytron wider than its length. Tympanal organ small, open. Last abdominal tergite large, its posterior margin bilobate, deeply incurved in middle ; supra-anal plate small, shorter than cerci, with apex sinuate ; cercus compressed, widened in basal part, narrowed towards apex, slightly incurved and downcurved in apical part, apex subacute ; subgenital plate with lateral, ridge-like formation.

Phallic complex : valves of cingulum large ; valves of penis straight ; basal valve widened and excurved ; apical valve straight and slender. Epiphallus with large bridge, weakly sclerotized in middle and large, narrow, incurved anterior projections ; lophi fused to bridge, with large, narrow hooks ; dorso-lateral appendices short, narrow, with large, club shaped apices.

General coloration olive-brown ; head, pronotum, meso-metanotum and first abdominal tergite above with ochraceous stripe ; face ochraceous ; ochraceous stripe running from eye, through lower part of lateral lobe of pronotum, up to base of hind femur ; elytron red, its anterior external part black ; crescent of hind knee blackish on both sides ; hind tibia with lower side olive-green, upper side brownish ; spines ochraceous, with brown apices.

♀. Larger than male. Integument more rugose. Antenna 21-segmented. Metanotum and first abdominal tergite inflated ; projection on first abdominal tergite comparatively small, with rounded apex. Tympanal organ vestigial. Valves of ovipositor short, robust, with acute apices ; upper external margin of upper valve roughly serrated. Spermatheca vermicular, with single diverticulum. General coloration olive-brown or greenish. In other respects as the male.

Length of body ♂ 24·0, ♀ 30·0–34·0 ; pronotum ♂ 3·5, ♀ 4·6–5·0 ; hind femur ♂ 12·5, ♀ 13·3–13·6 mm.

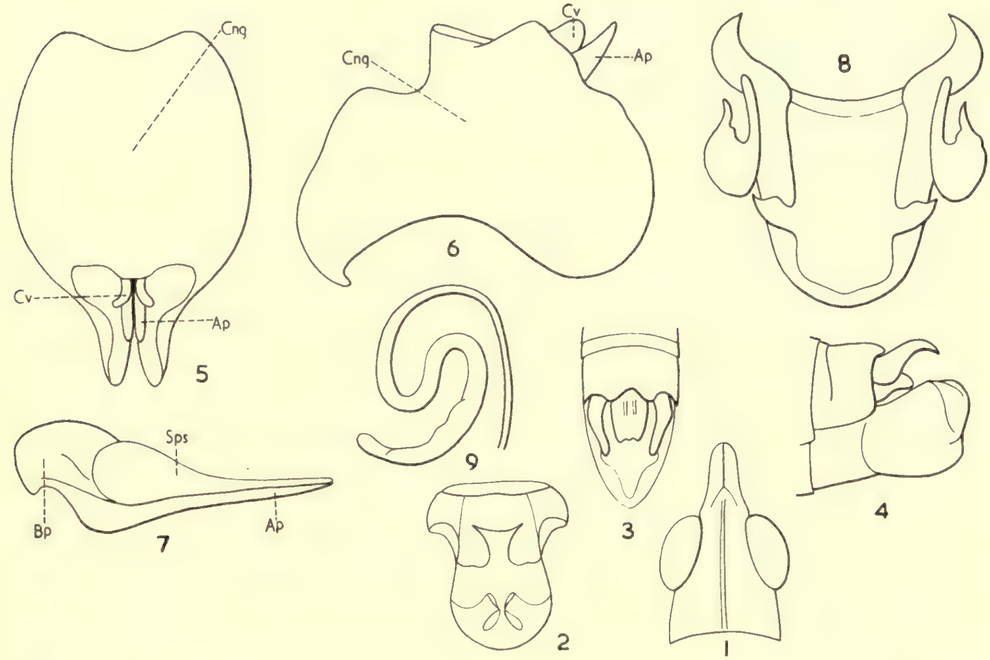

FIG. 13. *Caprorhinus minor* Uvarov, 1929. ♂ type. 1, head from above. 2, meso- and metasternum. 3, end of abdomen, from above. 4, the same, lateral view. 5, phallic complex from above, epiphallus and ectophallic membrane removed. 6, the same, lateral view. 7, penis and spermatophore sac. 8, epiphallus. 9, spermatheca.

Type locality : S.E. Madagascar, Vohimarina, Tongolory, Tuléar. Type in British Museum (Natural History).

Madagascar Ouest : Morondava, forêt sud de Befasy, i.1956, 1 ♂, 3 ♀ (*R. Paulian*).
Madagascar Sud : Tranoroa, 2 ♀ (*R. Paulian*).

Caprorhinus squamipennis Bruner, 1910
(Text-fig. 14)

♂ Type. (Redescription.) Small. Integument finely rugose. Antenna 18-segmented, much longer than head and pronotum together. Fastigium of vertex twice as long as its width in middle, its sides in basal part slightly excurved, in apical part almost parallel, apex parabolic ; upper, compressed part of frontal ridge excurved, at apex angularly merging with fastigium of vertex. Median carina of pronotum hardly traceable ; metazona about one third of length of prozona, its posterior margin slightly incurved, almost straight. Prosternal process with obtuse apex. Protruding part of elytron about twice as long as its width. Tympanal organ vestigial. Last abdominal tergite large, shallowly bilobate. Supra-anal plate small, parabolic, shorter than cerci ; cercus comparatively slender, slightly widened in basal part, in apical part slightly incurved and downcurved ; subgenital plate, in profile, with rounded apex and ridge-like fold, ending in upper part with small tubercle.

General coloration olive-brown ; ochraceous stripe on lower half of lateral lobe of pronotum up to base of hind femur ; similar stripe running along middle of head, pronotum and up to second abdominal tergite ; elytron bright red, with basal external side black, hind knee brownish ; hind tibia olive-green.

♀. Larger than male. Fastigium of vertex relatively shorter. Elytron only slightly protruding under pronotum. Metanotum and first abdominal tergite slightly inflated ; projection on first abdominal tergite with rounded apex. Ovipositor short, robust, valves with acute, curved apices ; external upper margin of upper valve roughly serrated. Subgenital plate slightly trilobate, with angular median and wide, slightly excurved lateral lobes. In other respects as the male.

Length of body ♂ 16·0, ♀ 25·0 ; pronotum ♂ 2·4, ♀ 5·1 ; hind femur ♂ 9·0, ♀ 12·5 mm.

Type locality : Comoro Is., Anjouan Cercle de Bombao, 500 m.

Only the type and one female paratype (both in Berlin Museum) of this species are known. The second female paratype is probably lost.

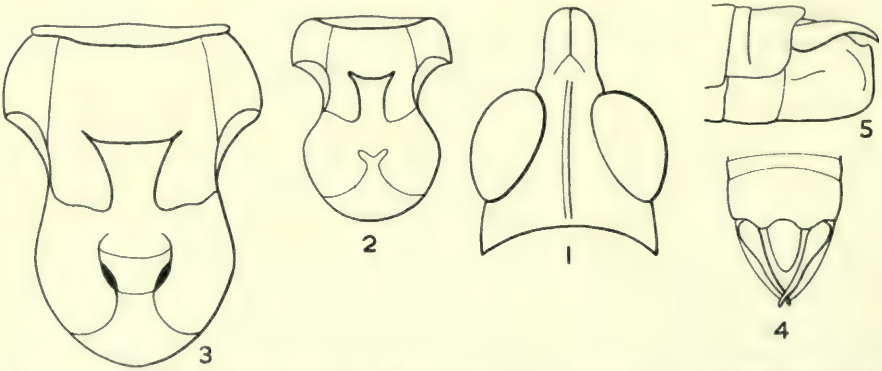

Fig. 14. *Caprorhinus squamipennis* Bruner, 1910. ♂ type. 1, head from above. 2, meso- and metasternum, male. 3, the same, female. 4, end of male abdomen from above. 5, the same, lateral view.

GYMNOHIPPUS Bruner, 1910

Of submedium size. Integument granulose. Antenna thick filiform, shorter than head and pronotum together. Fastigium of vertex short, wide, angular ; fastigial furrow short ; upper fastigial areolae poorly developed ; head short, conical ; frons, in profile, slightly incurved ; frontal ridge low, narrow, shallowly sulcate, compressed and roundly protruding between antennae. Pronotum cylindrical, without carinae ; dorsum crossed by two deep sulci ; metazona about one third of length of prozona, its posterior margin straight ; lateral lobe of pronotum longer than its height, its lower margin oblique. Prosternal process short, pyramidal. Mesasternal interspace longer than its width, distant from metasternal one. Elytra, wings and tympanal organ absent. Hind femur of medium width, its basal lobes about equal length ; lower lobes of hind knee obtusangular ; external apical spine of hind tibia present. Arolium large. Last abdominal tergite of male long, with a pair of rounded projections. Male supra-

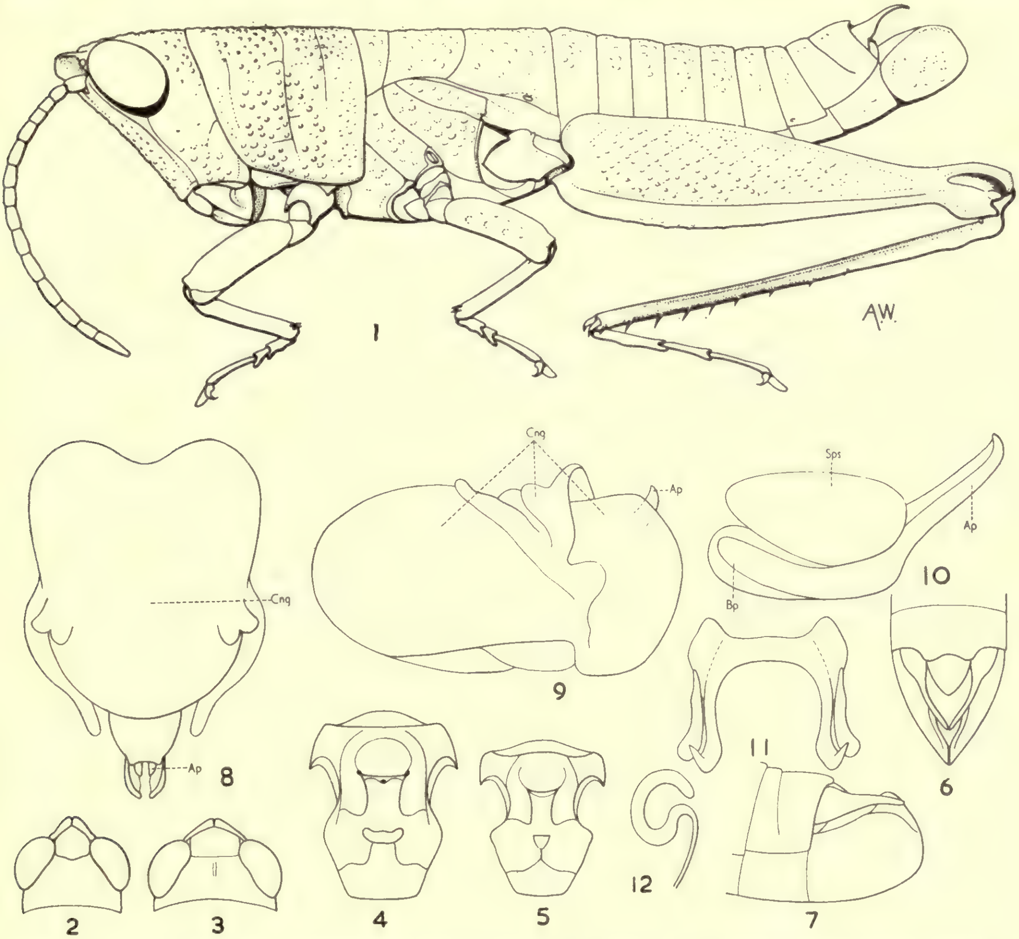

FIG. 15. *Gymnohippus marmoratus* Bruner, 1910. 1, male. 2, head of male from above. 3, the same, female. 4, meso- and metasternum, female. 5, the same, male. 6, end of male abdomen from above. 7, the same, lateral view. 8, phallic complex from above, epiphallus and ectophallic membrane removed. 9, the same, lateral view. 10, penis and spermatophore sac. 11, epiphallus. 12, spermatheca.

anal plate angular, about half as long as cerci ; cercus elongated, at basal part widened, in apical half strongly narrowed, slightly incurved and downcurved ; subgenital plate compressed, in profile, with rounded apex. Ovipositor short, robust, with valves curved at apices.

Phallic complex : cingulum wide, with lateral bulges ; valves of cingulum absent ; penis short ; basal valve moderately widened ; apical valve upcurved, with subacute apex ; spermatophore sac very large. Epiphallus with short bridge ; ancorae absent ; lophi elongated, slender, with large hooks.

Spermatheca narrow, S-shaped, with single diverticulum.

Type species : *Gymnohippus marmoratus* Bruner, 1910.

Gymnohippus marmoratus Bruner, 1910
(Text-fig. 15)

Gymnohippus marmoratus Bruner, 1910 : 637.
Gymnhippus conspersipes Bruner, 1910 : 637 ; Kevan, 1962, in litt.
Gymnohippus granulosus Bruner, 1910 : 637 ; Kevan, 1962, in litt.

♂. Antenna 15-segmented. Fastigium of vertex about twice as wide as its length, convex and granulose. Pronotum strongly granulose. Mesosternal interspace about half again as long as its width, with slightly incurved sides ; metasternal interspace inverse triangular. General coloration sandy-ochraceous, sometimes greenish, sometimes with marmorate darkish pattern ; mandible reddish ; mesonotum sometimes with reddish transverse stripe ; hind tibia in lower half carmine-red, sometimes blackish.

♀. Larger than male. Antenna 14 or 15-segmented. Fastigium of vertex about three times as wide as its length. Mesosternal interspace longer than its width, but relatively wider than in male ; metasternal interspace transverse. Coloration as in the male, but hind tibia ochraceous or slightly greenish. Otherwise as the male.

Length of body ♂ 14·5–19·0, ♀ 22·0–27·0 ; pronotum ♂ 3·2–3·7, ♀ 4·5–5·2 ; hind femur ♂ 9·0–9·5, ♀ 10·0–11·7 mm.

Madagascar Sud-Ouest : Lac Tsimanampetsotsa, v.1951, 1 ♀ (*R. Paulian*) ; Efoetsy, v.1951, 1 ♂, 1 ♀ (*A. Robinson*) ; Anakao (Haut), dct. de Tuléar, 2.iv.1953, 1 ♂, 1 ♀ (*A. Robinson*) ; Itampolo, 13.v.1951, 2 ♀ (*R. Paulian*).

This species varies in body size ; in sculpture of integument, which is sometimes more, sometimes less granulose, and in coloration as mentioned above.

PARASPHENA I. Bolivar, 1884

Small to medium size. Body approximately cylindrical. Integument rugose. Antenna rod-like, thick, shorter than head and pronotum together. Fastigium of vertex with parabolic apex, convex surface and large apical fastigial areolae ; head acutely conical ; frons strongly oblique and incurved ; frontal ridge low, narrow, with deep sulcus and obtuse lateral carinulae. Pronotum cylindrical or subcylindrical, slightly widening backwards ; median carina obtuse, crossed by two sulci ; weak lateral carinae present or absent ; metazona about one third or one fourth of length of prozona, its posterior margin incurved. Prosternal process conical, with wide base and acute, slightly attenuate apex ; in female sometimes transverse, low, with slightly protruding subacute apex. Mesosternal interspace distant from metasternal. Elytra, wings and tympanum absent. Hind femur narrow. Hind tibia not expanded or scarcely expanded ; external apical spine present. Arolium large. Male supra-anal plate angular. Cercus conical. Subgenital plate with almost rounded apex. Ovipositor moderately long, with valves curved at apices.

Type species : *Sphenarium pulchripes* Gerstaecker, 1869.

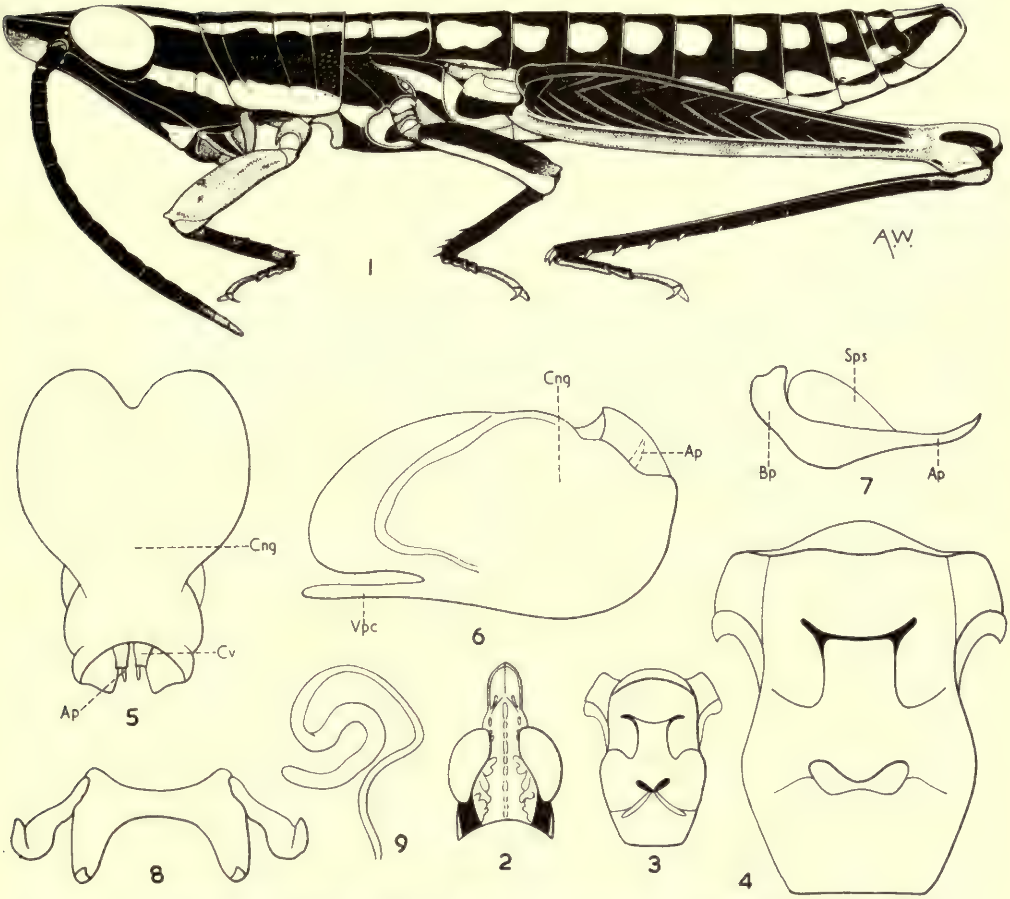

FIG. 16. *Parasphena dispar* sp. n. ♂ type. 1, male. 2, head from above, male. 3, meso- and metasternum, male. 4, the same, female. 5, phallic complex from above, epiphallus and ectophallic membrane removed. 6, the same, lateral view. 7, penis and spermatophore sac. 8, epiphallus. 9, spermatheca.

***Parasphena dispar* sp. n.**

(Text-fig. 16)

♂ Type. Small. Body cylindrical. Integument rugose and tuberculate. Antenna 17-segmented. Head narrow, acutely conical ; fastigium of vertex elongate, at base widened ; carinula of vertex strong ; two lateral rows of callosities along head above ; postocular row of tubercles low. Median carina of pronotum low, thick ; lateral carina absent ; metazona about one fourth length of prozona, its posterior margin slightly angularly incurved. Mesosternal interspace longer than its width ; metasternal interspace with large foveolae. Lower lobes of hind knee angular. Last abdominal tergite of male with deep, rounded incision. Supra-anal plate narrow, acutangular ; cercus simple, obtusely conical with slightly incurved apex ; subgenital plate compressed, slightly elongated, with rounded apex.

Phallic complex : cingulum pear-shaped ; valves of cingulum short, with obtuse apices ; penis moderately slender ; basal valve slightly widened and upcurved ; apical valve slender with acute apex ; spermatophore sac large. Epiphallus with short bridge ; lophi short and wide, with small hooks ; dorso-lateral appendices slightly shorter than lophi, widened at apices, with upcurved apical hooks.

General coloration brown, with yellow pattern ; frons near clypeus with a pair of yellow spots ; mandibles dark red ; along whole dorsal side of body, from eyes to supra-anal plate, there are a pair of yellow stripes, on abdomen disintegrated into spots ; postocular row of tubercles, lower part of lateral lobe of pronotum and pleura yellow ; anterior and middle legs reddish ; hind femur on external side brownish-red, all other sides dull red ; crescents of hind knee brown on both sides ; hind tibia dark brown, with whitish spines.

♀. Paratype. Much larger than male. Body slightly fusiform. Integument tuberculate, shiny. Antenna 17-segmented. Head moderately narrow, acutely conical ; fastigium of vertex less elongated and relatively wider than in male. Median carina of pronotum almost obliterated ; lateral carinae absent. Prosternal process as in male. Lower valve of ovipositor with small, lateral, rounded projection. Posterior margin of subgenital plate straight, with narrow, angular projection in middle.

Spermatheca with slender, S-curved single diverticulum.

General coloration olive-green with yellowish and reddish pattern ; head olive-greenish with yellowish tubercles ; fastigium of vertex and basal part of antenna reddish ; mandibles reddish ; pronotum olive-green, with tubercles yellowish and reddish stripe along middle and along posterior margin ; abdomen yellowish, stripe along dorsal part and posterior margins of tergites brownish red ; external side of hind femur olive-green, other sides dull reddish ; hind tibia ochraceous ; end of ovipositor reddish.

Length of body ♂ 17·0, ♀ 28·0–41·0 ; pronotum ♂ 2·8, ♀ 5·0–6·0 ; hind femur ♀ 8·0, ♀ 13·0–15·3 mm.

Madagascar Centre : Forêt Vakoana, Ambalamarovandana 1,530 m., Andringitra, Ambalavao, 21.i.1958, 1 ♀ (*P. Griveaud*) ; Plateau Soaindrana, 2,090 m., Andringitra, Ambalavao, 15–16.i.1958, 20 ♀ (*R. Paulian*) ; Cirque Boby 2,500 m., Andringitra, Ambalavao, 12–13.i.1958, 3 ♂ (including type), 17 ♀ (*R. Paulian*). Pic d'Ivohibe, 2,200 m., 8.xi.1950, 1 ♀ (*J. Millot*). Type in the Paris Museum.

This new species is placed in the genus *Parasphena* on the basis of the phallic complex. When compared with the phallic complex of *Parasphena pulchripes*, the type species, it appeared identical in all essential features. The characters which are not typical of *Parasphena*, like more pronounced sexual dimorphism, more slender body of male, more elongated fastigium of vertex, may not significantly upset the diagnosis of the genus. However, the whole genus and the group of genera near *Parasphena* badly need revision to clarify interrelations between the genera and species of the group.

DYSCOLORHINUS Saussure, 1899

Of medium size. Body elongated, slender, narrow cylindrical. Integument rugose and tuberculate, shiny. Antenna slightly widened in basal part and tapering towards apex, about as long as head and pronotum together. Fastigium of vertex longer than its width, with apex parabolic ; upper fastigial areolae poorly developed ; fastigial furrow moderately long ; head narrow, acutely conical ; frontal ridge low, narrow, sulcate, slightly raised and widened between antennae, angularly merging with fastigium of vertex ; postocular row of tubercles present. Pronotum cylindrical ; median carina hardly traceable ; lateral carinae represented by a row of low tubercles ; one or two weak sulci crossing dorsum ; metazona much shorter than prozona, its posterior margin slightly incurved, almost straight. Prosternal process low pyramidal. Mesosternal interspace longer than its width in middle with strongly incurved sides, distant from metasternal interspace. Elytra, wings and tympanal organ absent. Hind femur slender ; lower lobes of hind knee acutangular ; hind tibia slightly widening towards apex ; external apical spine of hind tibia present. Arolium large. Last abdominal tergite of male with deep, rounded incision. Supra-anal plate short, angular ; cercus short, obtusely conical ; sub-

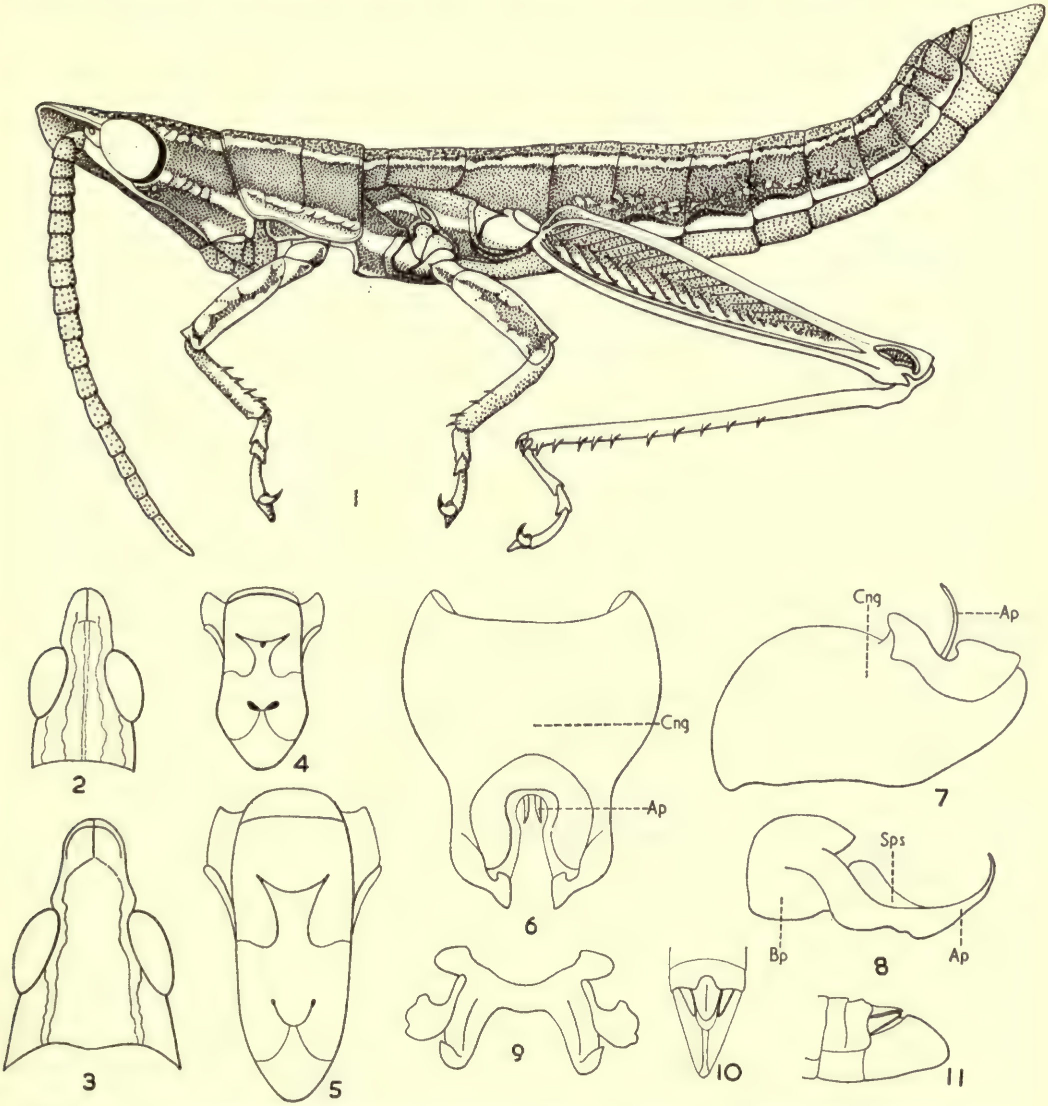

FIG. 17. *Dyscolorhinus squalinus* Saussure, 1899. 1, male. 2, head from above, male. 3, the same, female. 4, meso- and metasternum, male. 5, the same, female. 6, phallic complex from above, epiphallus and ectophallic membrane removed. 7, the same, lateral view. 8, penis and spermatophore sac. 9, epiphallus. 10, end of male abdomen, from above. 11, the same, lateral view.

genital plate elongate conical. Ovipositor short, moderately robust, with valves curved at apices ; posterior margin of subgenital plate with lateral parts roundly excurved, median part incurved, with narrow angular projection.

Phallic complex : cingulum comparatively large ; valves of cingulum absent ; penis strongly curved ; basal valve strongly widened ; apical valve strongly narrowed and upcurved, with acute apex ; spermatophore sac relatively small. Ephiphallus with short bridge with pair large lateral projections ; lophi wide, with strong, large hooks ; dorso-lateral appendices strongly widened at apices.

Type species : *Dyscolorhinus squalinus* Saussure, 1899.

Dyscolorhinus squalinus Saussure, 1899

(Text-fig. 17)

♂. Antenna 18-segmented. Carinula of vertex present ; head above with two rows of lateral callosities ; facial carinulae strong, wide. Lateral lobe of pronotum much longer than its height, its lower margin slightly oblique and sinuate. General coloration olive-brown or brown, with orange-yellow pattern ; carinae, tubercles and callosities on head orange-yellow ; lateral carinae and lower margin of lateral lobe of pronotum orange-yellow ; side of abdomen with a pair of orange-yellow longitudinal stripes ; medial external area of hind femur in upper part blackish, in lower part yellow ; upper external area orange ; lower external area and lower and internal side orange-red ; internal side of hind knee brown ; hind tibia blackish-brown.

♀. Much larger than the male. Antenna 18-segmented. Fastigium of vertex relatively wider than in male ; carinula of vertex absent. Coloration as in male, but duller, with less developed orange-yellow pattern.

Length of body ♂ 16·0–17·5, ♀ 26·6–38·0 ; pronotum ♂ 2·3–2·5, ♀ 4·0–4·5 ; hind femur ♂ 7·0–8·2, ♀ 11·0–12·5 mm.

The female lectotype, designated by Dirsh 1961, preserved in Geneva Museum. Type locality : " Madagascar ".

Madagascar Centre : Tananarive, ix.1954, 1 ♀ (*R. Paulian*) ; Station de Pisciculture, Manjakatompo, 23.xii.1947, 1 ♀ (*P. Cachan*) ; Km. 30 Rte. d'Ambatolampy, Face Est d'Iharanandriana, 18.xii.1953, 2 ♂ (*A. Robinson*).

***AMBOSITRACRIS* gen. n.**

Of submedium size. Body strongly elongated, slender, narrow, cylindrical. Integument rugose and shiny. Antenna about as long as head and pronotum together, slightly thickened in basal part ; apical segment slightly bilobate at apex. Fastigium of vertex longer than its width, parabolic ; fastigial furrow moderately long ; upper fastigial areolae well developed ; head narrow, acutely conical ; frons strongly oblique and slightly incurved ; frontal ridge low, sulcate, angularly merging with fastigium of vertex ; carinula of vertex present ; postocular row of tubercles present. Pronotum cylindrical ; median carina hardly discernible ; lateral carinae absent ; two weak sulci crossing dorsum ; metazona about one fourth to one fifth of length of prozona, its posterior margin slightly incurved, almost straight. Prosternal process low pyramidal, forming part of collar. Mesosternal interspace longer than its width in middle part, distant from metasternal one. Elytra, wings and tympanal organ absent. Hind femur slender, not reaching end of abdomen ; lower lobes of hind knee acutangular ; hind tibia slightly widening towards apex ; external apical spine present. Arolium large. Last abdominal tergite of male with deep, rounded incision. Supra-anal plate very small, narrow angular ; cercus subconical, slightly incurved, with obtuse apex ; subgenital plate with trilobate apex, formed by lateral and median carinulae, lateral carinulae forming projections on sides of plate.

Ovipositor moderately short, with valves curved at apices ; subgenital plate of female weakly trilobate, with wide, short lateral and narrow angular median lobes.

Phallic complex : cingulum constricted in middle ; valves of cingulum present ; ventral posterior process of cingulum very long ; basal valve of penis moderately widened ; apical valve of penis narrow, with acute apex. Epiphallus with moderately long bridge ; lophi wide, with large hooks ; dorso-lateral appendices widening towards apices.

Spermatheca narrow, with two diverticula, preapical one being very small.

Type species : *Ambositracris ornatus* sp. n.

This new genus in body shape, pattern and coloration is superficially very similar

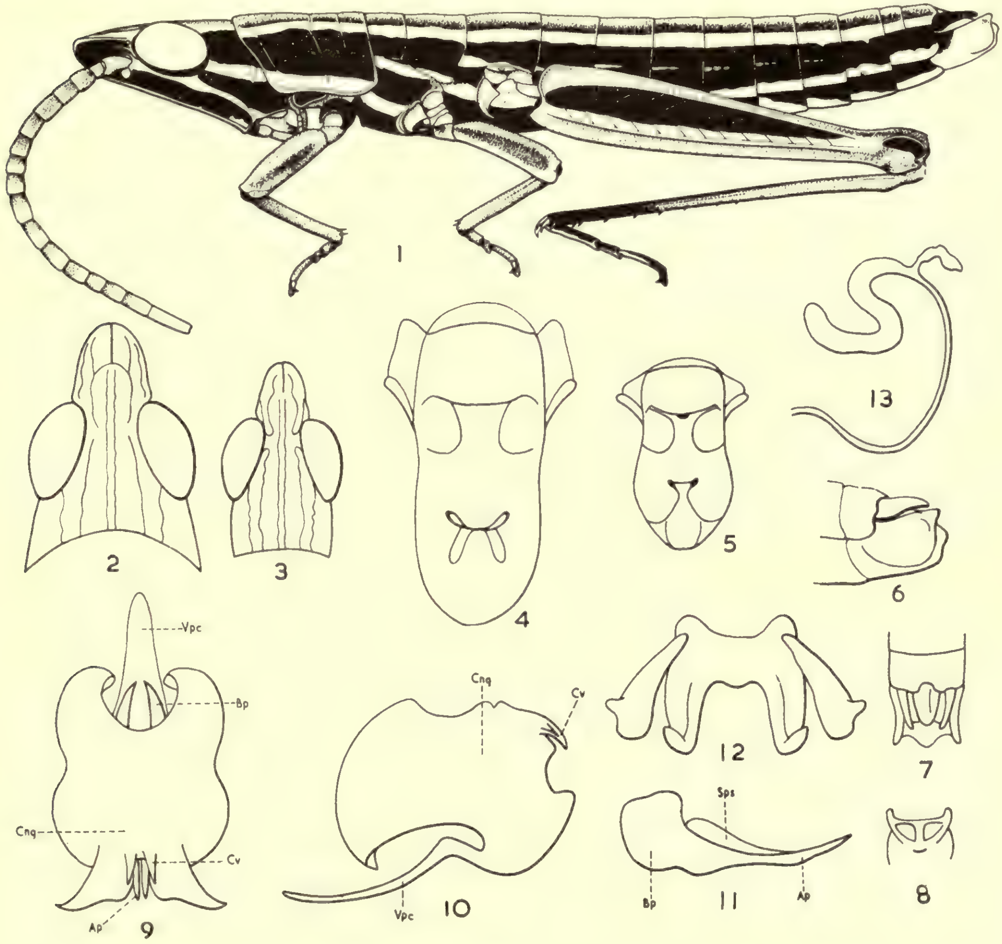

FIG. 18. *Ambositracris ornatus* sp. n. ♂ type. 1, male. 2, head from above, female. 3, the same, male. 4, meso- and metasternum, female. 5, the same, male. 6, end of male abdomen, lateral view. 7, the same, from above. 8, male subgenital plate, posterior view. 9, phallic complex from above, epiphallus and ectophallic membrane removed. 10, the same, lateral view. 11, penis and spermatophore sac. 12, epiphallis. 13, spermatheca.

to *Dyscolorhinus* Saussure. However, the structure of the subgenital plate of the male is quite different, that of *Dyscolorhinus* being plain conical, while that of *Ambositracris* has a complicated structural arrangement at the apex and sides. The phallic complex in each is very different (Text-figs. 17, 18), so much so that it is impossible even to consider them closely related at all.

The systematic position of the new genus therefore is rather obscure, and for the time being it cannot be attached to any group of genera in the family.

Ambositracris ornatus sp. n.

(Text-fig. 18)

♂ Type. Small. Antenna 17-segmented. Fastigium of vertex and head above with pair of lateral, longitudinal callosities. Lateral lobe of pronotum much longer than its height, its lower margin slightly oblique and sinuate. Mesosternal interspace with apex strongly widened; mesosternal lobes rounded. General coloration brown, with yellow pattern; lateral carinulae of fastigium of vertex and head, facial carinae and postocular row of tubercles yellow; dorsum of pronotum with a pair of yellow, lateral stripes; lateral lobe of pronotum with wide yellow stripe along lower margin; pleura with yellow stripes; side of abdomen with a pair of longitudinal stripes and yellow streaks between them; external medial area of hind femur yellow, with blackish longitudinal stripe; upper and lower external areas and internal side of the femur orange-red; internal side of hind knee brown; hind tibia blackish-brown.

♀. As the male, but much larger. Antenna 17 or 18-segmented. Lower valve of ovipositor with small, angular, lateral projection. General coloration and pattern as in the male, but duller.

Length of body ♂ 15·3, ♀ 20·6–23·0; pronotum ♂ 2·3, ♀ 3·2; hind femur ♂ 6·8, ♀ 9·0 mm.

Madagascar Centre: Ankazomivady, 1,640 m., Ambositra, vii.1957, 1 ♂, (type), 5 ♀ (*A. Robinson*); Ankaratra, Col. de Faratsiho, 1 ♀ (*R. Paulian*); Ambohiby, 1,600 m., Tsiroanomandidy, 26.v.1948, 1 ♀ (*R. Paulian*). Type in the Paris Museum.

SAGITTACRIS gen. n.

Of medium size. Body slender, elongated. Integument finely rugose. Antenna filiform, longer than head and pronotum together. Head elongated, acutely conical; fastigium of vertex elongated, narrow angular; fastigial furrow moderately long; fastigial areolae poorly developed; frons, in profile, slightly sinuate, frontal ridge very low, between and in front of antennae lamelliformly compressed, sulcate on whole length, angularly merging with frontal ridge and slightly excised at apex. Pronotum cylindrical, with traces of median and without lateral carinae; three weak sulci crossing dorsum; metazona about one fifth of length of prozona, its posterior margin straight. Prosternal process conical, with obtuse apex. Mesosternal interspace open; metasternal interspace distant from mesosternal. Elytra, wings and tympanal organ absent. Hind femur slender, not exceeding end of abdomen. External apical spine of hind tibia present. Tarsus elongated, half as long as tibia. Arolium large. Male supra-anal plate simple, narrow angular; cercus simple, conical; subgenital plate short, subconical.

Phallic complex: cingulum pear-shaped; valve of cingulum short; basal valve of penis strongly upcurved and widened; apical valve straight, with acute apex; spermatophore sac small. Epiphallus with short bridge; lophi robust, with strong hooks.

Type species: *Sagittacris malagassus* sp. n.

The new genus differs strongly from all known genera of *Pyrgomorphidae*. It is just possible that *Sagittacris* is remotely related to *Parorthacris* Dirsh, 1957.

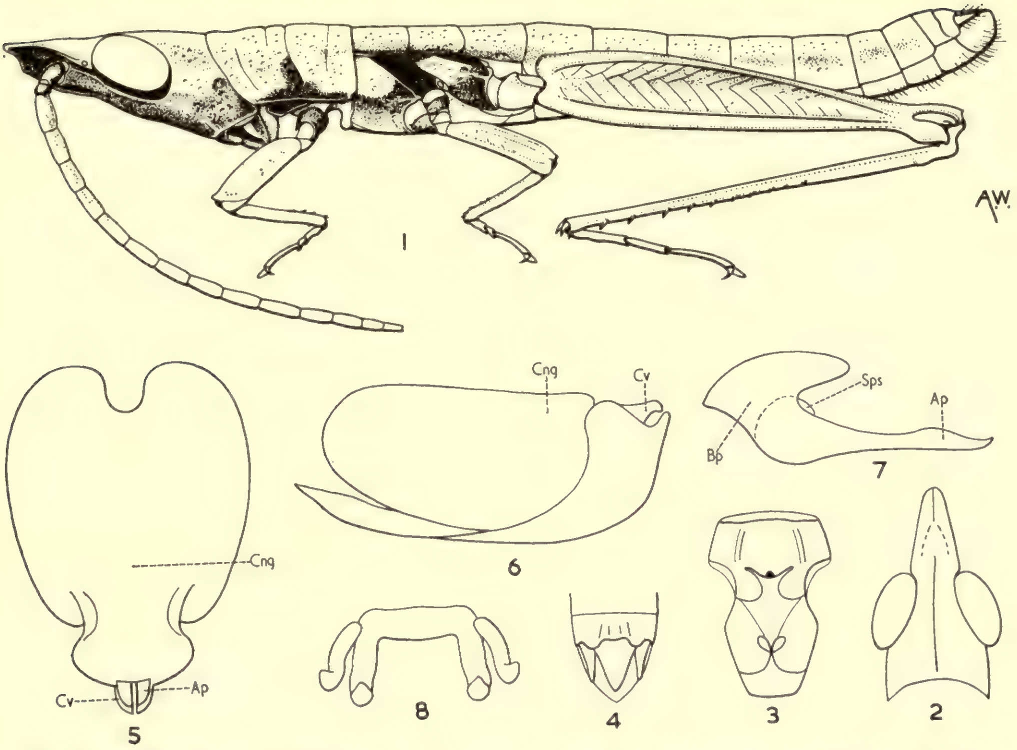

FIG. 19. *Sagittacris malagassus* sp. n. ♂ type. 1, male. 2, head from above. 3, meso- and metasternum. 4, end of abdomen from above. 5, phallic complex from above, epiphallus and ectophallic membrane removed. 6, the same, lateral view. 7, penis and spermatophore sac. 8, epiphallus.

***Sagittacris malagassus* sp. n.**
(Text-fig. 19)

♂ Type. Antenna 16-segmented ; apical segment at apex slightly excised. Head above with weak median carinula. Lateral lobe of pronotum much longer than its height, its lower margin almost straight, anterior angle widely rounded, posterior angle with small incision. Mesosternal interspace with widened anterior part and deep foveola ; mesosternal lobes short, rounded ; metasternal interspace substituted by two leaf-like depressions. Lower lobes of hind knee narrow, attenuate, with obtuse apices. Posterior margin of last abdominal tergite of male with shallowly excised apex and two small, widely separated, rounded projections.

General coloration brownish, ochraceous below ; two ochraceous spots on pleura ; hind tibia and tarsus bright red.

Only a single male type is known.

Length of body 24·0 ; pronotum 3·6 ; hind femur 10·2 mm.

Madagascar : Manambato, 1 ♂, type (*Anove*).

Type in Paris Museum.

PYRGOHIPPUS gen. n.

Small. Male body cylindrical, female slightly fusiform. Integument granulose. Antenna thick, almost filiform, thickened in basal part, much shorter than head and pronotum together. Fastigium of vertex moderately short, with apex parabolic ; fastigial furrow short ; upper fastigial areolae poorly developed ; head acutely conical, frons incurved ; frontal ridge low, sulcate, compressed and protruding between antennae, at frontal part of apex excised and angularly merging with fastigium of vertex. Pronotum cylindrical, slightly widening backwards ; median and lateral carinae absent ; two sulci crossing dorsum ; metazona about one third length of prozona, its posterior margin straight. Prosternal process in male low pyramidal, in female transverse, tubercle-like. Mesosternal interspace longer than its width, distant from metasternal one. Elytra, wings and tympanal organ absent. Hind femur comparatively short, its basal lobes of equal length ; external apical spine of hind tibia present. Arolium large. Last abdominal tergite of male large, with a pair of large angular projections. Supra-anal plate short, angular ; cercus compressed, short, angular, with acute apex ; subgenital plate slightly compressed, elongate conical. Ovipositor short, moderately robust, with almost straight valves. Subgenital plate with angular median projection.

Phallic complex : cingulum wide, with large strong dorsal sclerotization ; valves of cingulum absent ; valves of penis irregularly curved ; basal valve slightly widened ; apical valve human-leg-shaped. Epiphallus with wide bridge ; small, angular ancorae present ; lophi short, with acute hooks ; dorso-lateral appendices with club-like apices.

Spermatheca irregularly curved, vermicular, with single diverticulum.

Type species : *Pyrgohippus pallidus* sp. n.

This new genus externally resembles *Gymnohippus* Bruner (p. 75), but differs from it by the frontal ridge which is excised at its apex and by the shape of the whole head which is much more acute and narrow ; also by the structure of the male cerci, the last abdominal tergite and particularly by the structure of the phallic complex, which is strikingly different. It cannot be placed with certainty into any group of known genera or in the vicinity of any known genus.

Pyrgohippus pallidus sp. n.
(Text-fig. 20)

♂ Type. Body cylindrical. Antenna 14-segmented. Head strongly granulose ; fastigium of vertex longer than its width, parabolic ; short carinula of vertex present ; carinulae of frontal ridge low, obtuse. Lateral lobe of pronotum longer than its height, lower margin slightly oblique. Mesosternal interspace about twice as long as its width in middle, with incurved sides ; metasternal interspace reduced to a vertical slit, with foveolae above. Lower lobes of hind knee obtusely angular. General coloration pale ochraceous, without any pattern ; hind tibia greenish.

♀. Larger than the male. Body slightly compressed and slightly fusiform. Antenna 10 or 11-segmented. Head strongly granulose ; fastigium of vertex shorter than its width, widely parabolic ; carinula of vertex absent. Pronotum slightly compressed. Mesosternal interspace slightly longer than its width, with slightly incurved sides ; metasternal interspace transverse. Lower valve of ovipositor with angular lateral projection. In other respects as the male.

Length of body ♂ 15·5–19·6, ♀ 22·0–26·0 ; pronotum ♂ 2·8–3·5, ♀ 5·2–5·4 ; hind femur ♂ 8·0–9·0, ♀ 10·0–10·2 mm.

Madagascar Sud-Ouest : Lac Tsimanampetsotsa, v.1951, 1 ♀ (*R. Paulian*) ;

Efoetsy, v.1951, 1 ♂, 1 ♀ (*A. Robinson*) ; Anakao (Haut), Dct. de Tuléar, 2.iv.1953, 1 ♂, 1 ♀ ; Itampolo, 13.v.1951, 1 ♂, 1 ♀ (*R. Paulian*).

Type and paratypes in Paris Museum. Two males, one female paratypes in the British Museum (Natural History).

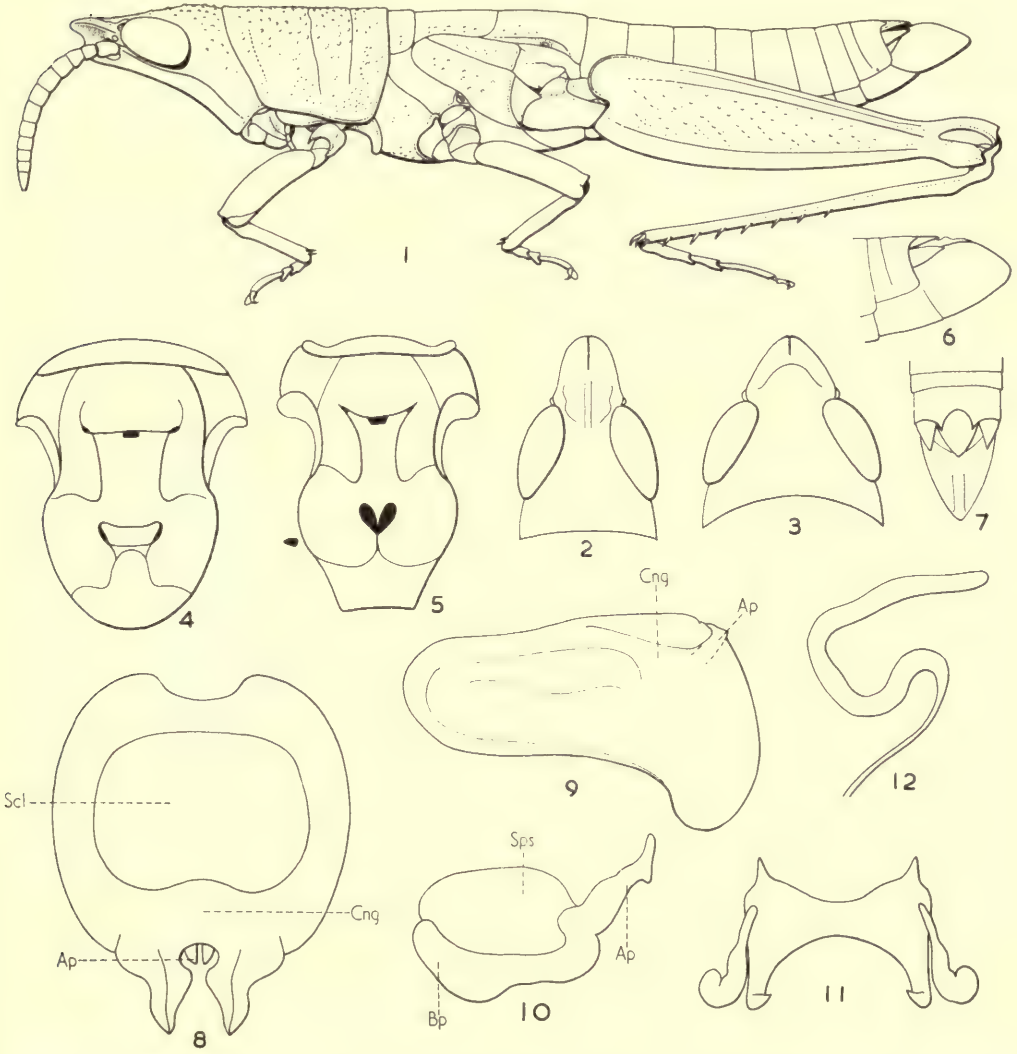

FIG. 20. *Pyrgohippus pallidus* sp. n. ♂ type. 1, male. 2, head from above, male. 3, the same, female. 4, meso- and metasternum, female. 5, the same, male. 6, end of male abdomen, lateral view. 7, the same, from above. 8, phallic complex from above, epiphallus and ectophallic membrane removed. 9, the same, lateral view. 10, penis and spermatophore sac. 11, epiphallus. 12, spermatheca.

GELOIUS Group

In 1899 Saussure described the genus *Geloius* with a single species *nasutus*. He placed it into the " Strips *Geloius* " of the tribe *Pyrgomorphii*. He then regarded the family *Pyrgomorphidae* as a tribe.

In 1905 I. Bolivar erected for this genus a new subfamily *Geloiinae*, considering *Pyrgomorphidae* as a family. In his " Genera Insectorum " 1909, however, he reduced *Pyrgomorphidae* to subfamily status and regarded *Geloiinae* as " section *Geloii* ".

Since the interrelations of the genera of *Pyrgomorphidae* at present are not sufficiently clear to allow its division into subfamilies, the indefinite term group is used here for *Geloius* and another new genus.

KEY TO GENERA

1 (2) Male anterior femur on external side with row of large teeth. End of abdomen not inflated. Cercus simple, conical (Text-fig. 21). . . ***GELOIUS*** (p. 80)

2 (1) Male anterior femur without teeth. End of abdomen strongly inflated. Cercus large, incurved, with wide basal, and strongly widened apical part, forming at lower part of apex an attenuate angular projection and in the upper part a very large, inverse axe-shaped projection (Text-figs. 25, 26) ***PSEUDOGELOIUS*** (p. 92)

GELOIUS Saussure, 1899

Body large, elongated, cylindrical. Integument rugose. Antenna shorter than head and pronotum together, triangular in cross section, very wide, slightly tapering towards apex ; segments strongly separated ; apical segment at apex slightly bilobate. Fastigium of vertex elongated, angular, forming with upper frontal part of head a large process ; fastigial areolae poorly developed ; frontal ridge between antennae lamelliformly compressed in profile, excised at apex and projecting, below antennae low, shallowly sulcate, with obtuse, low carinulae ; frons in profile strongly incurved ; compound eyes small, slightly oval, strongly convex ; ocelli vestigial. Pronotum cylindrical, only weak linear median carina present ; two sulci crossing dorsum ; metazona much shorter than prozona, not covering mesonotum. Prosternal process low, pyramidal, with flattened apex. Mesosternal interspace as wide as its length, with incurved sides and elongated lateral foveolae. Metasternal interspace distant from the mesosternal one. Elytra and wings vestigial or absent. Tympanal organ absent. Anterior and middle legs short ; external side of male anterior femur with a row of very large teeth, in female with a row of tubercles or strongly rugose. Hind femur moderately narrow. External apical spine of hind tibia present. Arolium large. Supra-anal plate in both sexes simple, elongate angular ; cercus in both sexes short, conical, straight or slightly incurved. Male subgenital plate short, subconical, with obtuse apex ; in female trilobate or with apical projection. Ovipositor moderately long, with valves curved at apices.

Type species : *Geloius nasutus* Saussure, 1899.

Besides their rather striking general appearance, the species of the genus *Geloius* possess two very distinct external characters. First, the anterior femur of the male has on the external side several large teeth. This character was not included by Saussure in the description of the genus, but he mentioned it in the description of the male of *G. nasutus*. However, he made the reservation that the male may not be conspecific with the female, which he described more fully and before the male. Probably he considered the female as the specific type, but did not designate it formally according to the present rules. I. Bolivar in his " Genera Insectorum " 1909 included this character in the generic diagnosis. As the males of all species of *Geloius* except *G. finoti* are lost there is no alternative but to consider this character, according to the description, as one of the most important generic characters. The concept of the genus may be altered, however, if this character is not found in all species.

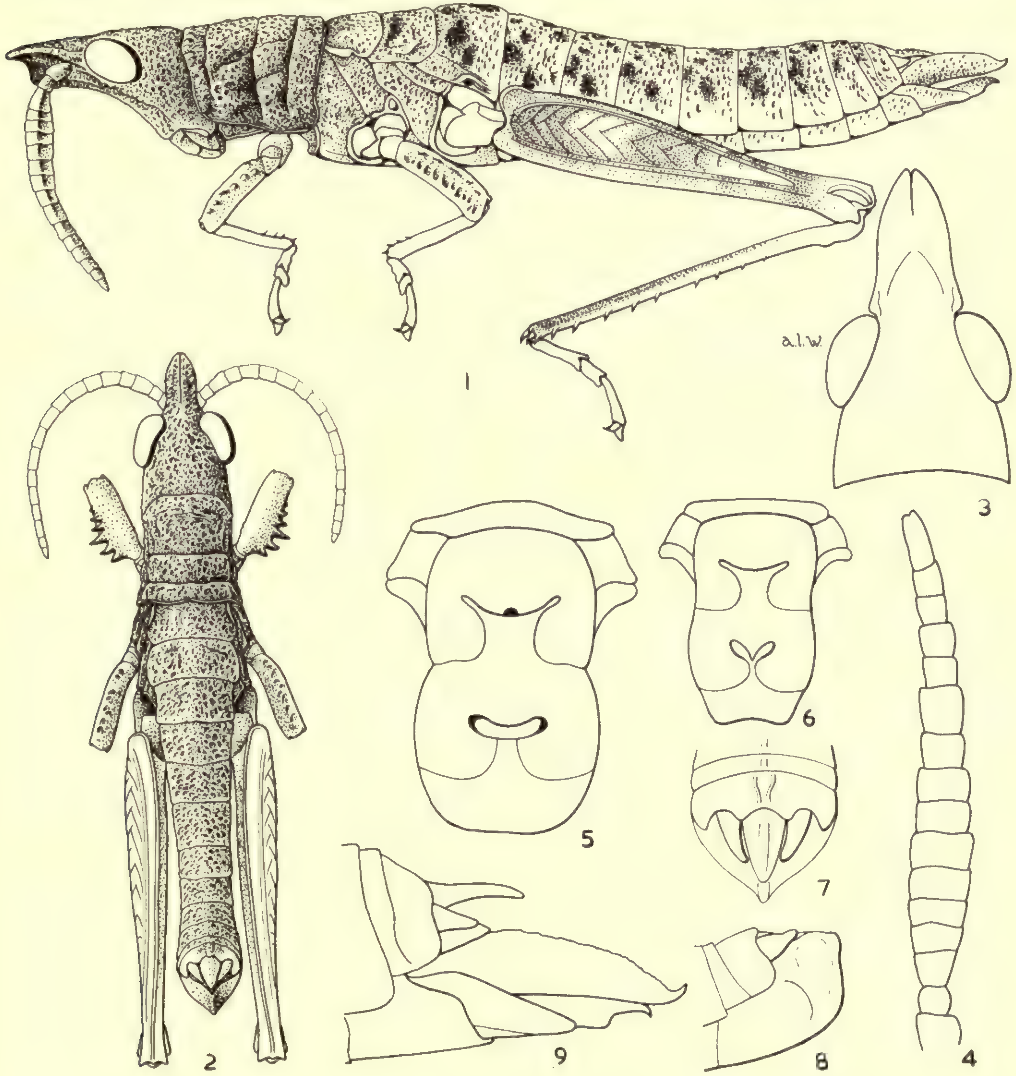

FIG. 21. *Geloius finoti* I. Bolivar, 1905. 1, female. 2, male. 3, head from above, female. 4, male antenna. 5, meso- and metasternum, female. 6, the same, male. 7, end of abdomen from above, male. 8, the same, lateral view. 9, end of abdomen, female.

The second important character is the male cercus, which, according to the description, is simple, narrow and conical in all species.

Both these characters need to be emphasized in connection with the new genus of the group described below.

Since only the male of *G. finoti* is known to me, the key below is given for females only. As the type of *G. decorsei* is lost and the species is not known to me, the key is based on I. Bolivar's (1905) key and description.

KEY TO SPECIES

Females

1 (2) Head without or with scarcely noticeable carinula of vertex (Text-fig. 21) **finoti** I. Bolivar

2 (1) Head with well developed carinula of vertex.

3 (6) Vestigial elytra present.

4 (5) Fastigium of vertex above elongated angular, with slightly expanded sides at basal part. Upper valve of ovipositor comparatively wide, in profile with convex, roughly serrated upper margin. Subgenital plate with apical process (Text-fig. 23) . . . . **nasutus** Saussure

5 (4) Fastigium of vertex elongated, strongly narrowed at apical, and comparatively strongly expanded at basal part. Upper valve of ovipositor narrow, in profile with straight, not serrated upper margin. Apex of subgenital plate trilobate (Text-fig. 24) . . . . **crassicornis** I. Bolivar

6 (3) Elytra and wings completely absent . . . . . **decorsei** I. Bolivar

Geloius finoti I. Bolivar, 1905

(Text-figs. 21, 22)

♂. Of medium size. Integument rugose. Antenna moderately widened, 16-segmented. Fastigium of vertex elongated, narrow angular, its lateral margins at base excurved ; carinula of vertex absent ; frontal ridge strongly protruding between antennae ; frontal process of head long, at apex with moderately deep incision. Ocelli rudimentary. Pronotum tuberculate and rugose ; posterior margin straight, with small, shallow incision in middle. Metasternal interspace X-shaped, with deep foveolae. Elytron elongated, narrow, scale-like. Abdomen moderately rugose. External side of hind femur with five large teeth. Hind femur moderately narrow, its external medial area with indistinct rhomboidal pattern ; lower lobe of hind knee angularly protruding. Supra-anal plate elongate, narrow angular with shallow longitudinal sulcus in middle ; cercus short, conical, slightly incurved, with obtuse apex ; subgenital plate short, subconical.

Phallic complex : Cingulum pear-shaped ; valve of cingulum large, slightly downcurved ; basal valve of penis large, expanded and excurved ; apical valve of penis narrow, at apex acute. Epiphallus with long arcuate bridge ; lophi widely separated, with strong hooks ; dorsal lateral appendices long, curved, with club-like, trilobate apices.

General coloration ochraceous, with numerous brownish spots, not forming definite pattern ; pronotum with reddish-brown spots ; lateral lobe in lower part with wide longitudinal stripe ; external side of hind femur ochraceous, internal side brown ; hind tibia brownish.

♀. Differs from the male by larger size. Antenna 16-segmented. Metasternal interspace transverse, with deep lateral foveolae. Supra-anal plate narrow, elongate angular, with transverse suture in middle ; cercus short, conical ; subgenital plate with acutangular apical projection ; valves of ovipositor comparatively slender ; upper valve narrow, its upper margin, in profile, excurved and serrated; lower valve with small lateral projection. Spermatheca with single, spiral curved apical diverticulum. Coloration as the male, but external side of hind femur with transverse ochraceous fascia ; hind knee and base of hind tibia orange-ochraceous.

Length of body ♂ 21·0–25·7, ♀ 38·0–40·0 ; pronotum ♂ 3·5–4·0, ♀ 5·4–6·0 ; hind femur ♂ 10·5–12·0, ♀ 13·5–14·0 mm.

I. Bolivar described *Geloius finoti* from several specimens of both sexes. He did not designate the type. Here the male specimen in the Paris Museum, bearing the label " Madagascar. Sikora ", is designated as lectotype.

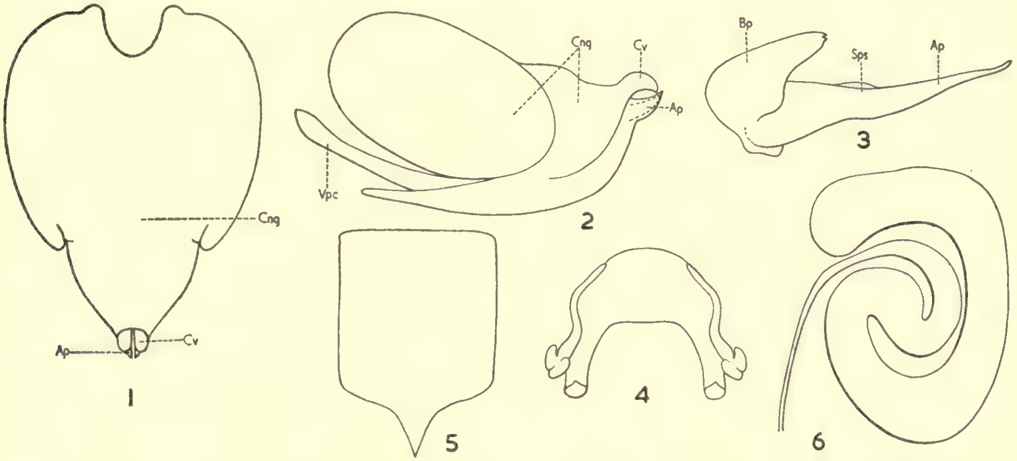

Fig. 22. *Geloius finoti* I. Bolivar, 1905. 1, phallic complex from above, epiphallus and ectophallic membrane removed. 2, the same, lateral view. 3, penis and spermatophore sac. 4, epiphallus. 5, female subgenital plate. 6, spermatheca.

" Madagascar (Sikora) " 1 ♂, 1 ♀.

Madagascar Est : Perinet, 3 ♂, 2 ♀. Dct. Sambava, Marojejy Ouest 1,600 m. xii.1959, 1 ♂ (*Pierre Soga*).

Madagascar Centre : Andranotobaka, 1,400 m., Ambatolampy iv.1957, 1 ♀ (*P. Griveaud*).

Geloius nasutus Saussure, 1899
(Text-fig. 23)

♀. Large. Integument strongly rugose. Antenna strongly widened, 15 or 16-segmented. Fastigium of vertex long, narrow-angular, sides at basal part slightly excurved ; carinula of vertex strong ; frontal ridge strongly protruding between antennae ; frontal process of head long, at apex with deep incision. Ocelli small. Pronotum strongly tuberculate and rugose ; its posterior margin slightly angularly incurved ; lateral lobe in posterior part of lower margin with obtusangular projection. Metasternal interspace X-shaped, with deep foveolae. Elytron elongated, scale-like. Abdomen strongly rugose. Anterior femur rugose. Hind femur moderately narrow ; its external medial area with indistinct rhomboidal pattern ; lower lobe of hind knee protruding, with rounded apex. Supra-anal plate elongate angular, with transverse suture in middle and two longitudinal obtuse carinulae with sulcus between them ; cercus short, wide, conical ; subgenital plate with strong median, apical, angular projection. Valves of ovipositor moderately long, upper valve in profile wide, its upper margin excurved and roughly serrated ; lower valve with obtuse lateral projection. General coloration brown ; internal side of hind femur in upper half dark brown ; hind tibia brownish ; elytron brown, covering small black spot.

♂ (After Saussure). Differs from female by smaller size, by the presence of large teeth on external side of anterior femur and by " styliform " cerci.

Length of body ♂ 23·0, ♀ 44·0–47·0 ; pronotum ♂ 3·5, ♀ 6·0–6·5 ; hind femur ♂ 11·0, ♀ 15·0–16·5 mm. (Male measurements according to Saussure.)

When describing the female and male *Geloius nasutus*, Saussure did not designate the type. He described the female first and the male second, and also remarked that the male may not be conspecific with the female. At present only the female specimen remains in Geneva Museum ; the male is absent and probably lost. No other male of this species has been recorded since.

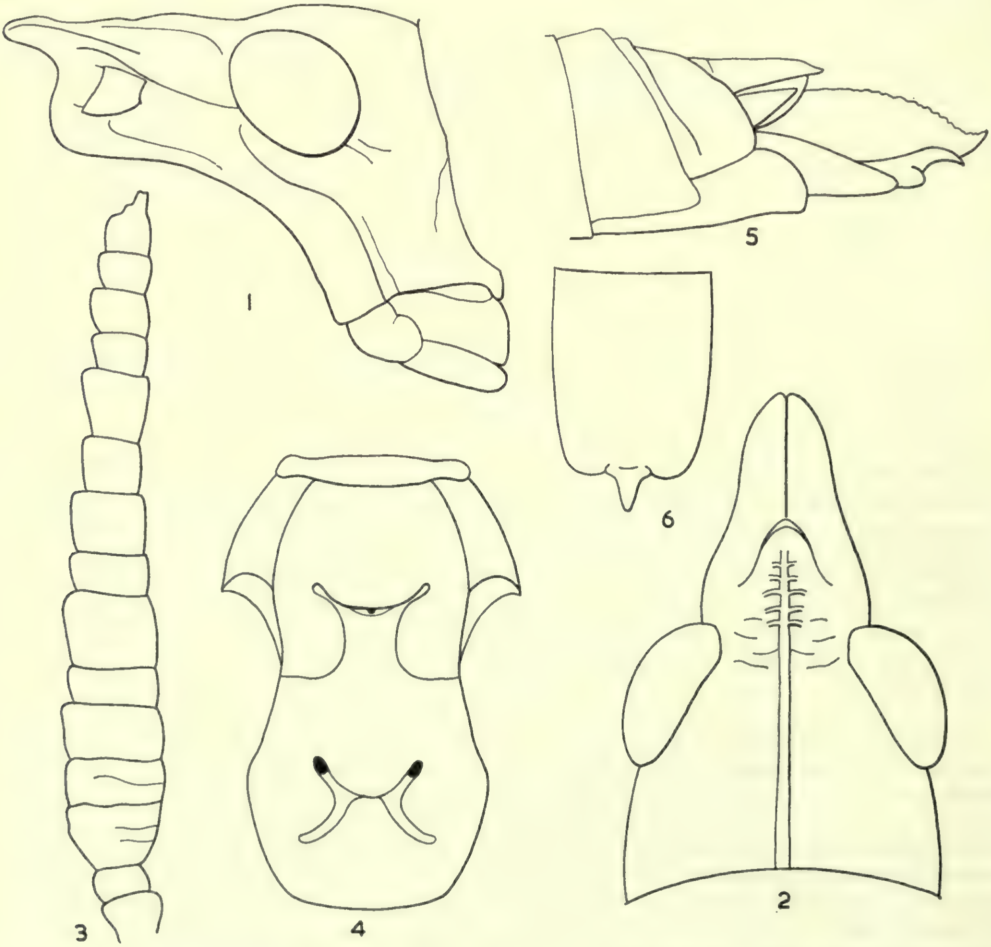

FIG. 23. *Geloius nasutus* Saussure, 1899. Female. 1, head, lateral view. 2, the same, from above. 3, antenna. 4, meso- and metasternum. 5, end of abdomen. 6, subgenital plate.

Here the female specimen is designated as the lectotype. It is preserved in Geneva Museum and was examined by me. Type locality is " Madagascar ".

Madagascar Ouest : Morondava, Forêt Sud de Befasy, i.1950, 1 ♀ (*R. Paulian*). Station Agric. Bas Mangoky, 1 ♀.

Madagascar Sud : Sept.-Lacs, 100 m. Tuléar, 14.ii.1955, 1 ♀ (*P. Griveaud*).

Geloius crassicornis I. Bolivar, 1905
(Text-fig. 24)

♀ Type. Large. Integument strongly rugose. Antenna strongly widened, 15-segmented. Fastigium of vertex long, narrow, with sides at basal part strongly excurved, carinula of vertex strong ; frontal ridge strongly protruding between antennae ; frontal process of head long and narrow, its apex with deep incision. Ocelli hardly traceable. Pronotum strongly tuberculate and rugose, its posterior margin truncate ; lateral lobes with rounded angles. Metasternal interspace X-shaped, with disconnected foveolae. Elytra elongate, scale-like. Abdomen rugose. Anterior femur strongly rugose. Hind femur moderately narrow ; external medial area with feather-like pattern ; lower lobe of hind knee protruding, with rounded apex. Supra-anal plate elongate angular with transverse suture in middle ; cercus short, conical ; subgenital plate trilobate, with short, widely rounded lateral lobes and short, angular middle lobe. Valves of ovipositor moderately long ; upper valve, in profile, narrow, its upper margin straight and not serrated ; lower valve with small lateral projection. General coloration of all parts of the body brownish.

Male unknown.

Length of body 35·0 ; pronotum 5·0 ; hind femur 12·3 mm. (The measurements were checked on the type.)

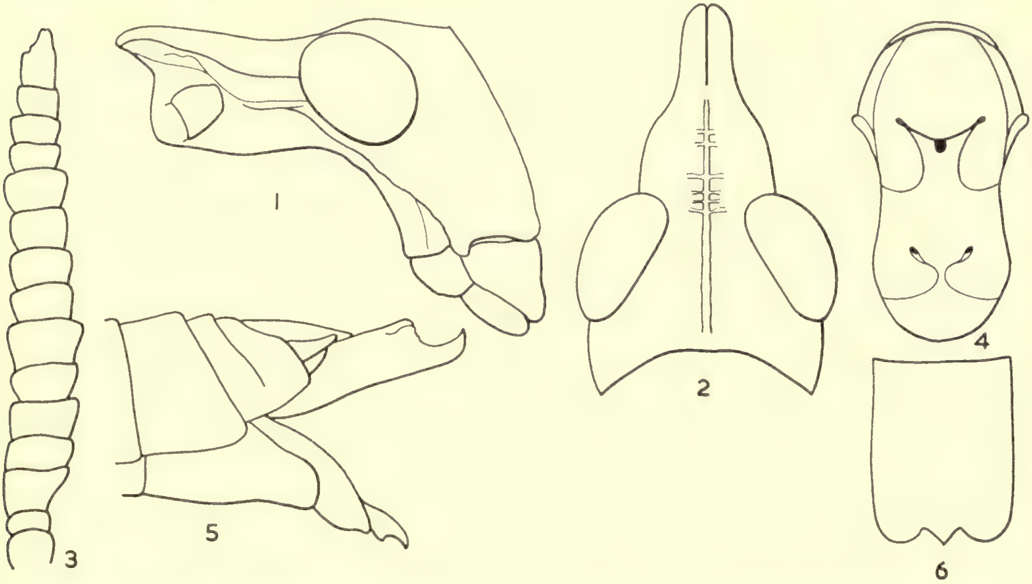

FIG. 24. *Geloius crassicornis* I. Bolivar, 1905. ♀ type. 1, head, lateral view. 2, the same, from above. 3, antenna. 4, meso- and metasternum. 5, end of abdomen. 6, subgenital plate.

Only the type of this species is known and was studied by me. The specimen is shrunk, having been pinned after preservation in spirit, but is otherwise intact.

This species is very near to *Geloius nasutus* Saussure, but differs in the structure of the ovipositor and subgenital plate (Text-figs. 23, 24).

The type specimen, a female, is in the Paris Museum, with locality label " Madagascar, Grandidier ".

Geloius decorsei I. Bolivar, 1905

This species was described from a male and a female from " Ambovombe, Madagascar (Dr. Decorse) 1901 ". Although according to the original description both specimens were deposited in the Paris Museum, they could not be found either there or in any other European Museum with which I. Bolivar had had connection. Most probably they are lost.

As this species is known now only by the description, I. Bolivar's diagnosis is cited below :

" Terrens ochraceus, rugosus. Capite supra inter oculos rugis auriculatis retrorsum in carinas productis ; fastigium medio subcoarctatum antice rotundatum a latere visum oculo vis longius ; ocelli perspicui minuti ; frons arcuato-sinuata. Pronotum rugulosum impresso-punctatum punctis nigris in ♂ praeditum. Femora postica intus extusque fascia arcuata nigra geniculari. Abdomen in longitudinem costulatum, punctis stigmaticis nigris. ♂ ♀.

Long. corp. ♂ 21 ; pron. 2·8 ; fem. post. 8·5 mill.
" " ♀ 50 ; " 5 ; " " 13 mill."

PSEUDOGELOIUS gen. n.

Body large, elongated, cylindrical. Integument rugose. Antenna shorter than head and pronotum together, in basal part triangular in cross section, widened, segments bead-like, separated, apical segment at apex slightly bilobate. Fastigium of vertex elongated, angular, forming large process with upper, frontal part of head ; fastigial areolae poorly developed, frontal ridge in upper part lamelliformly compressed and projecting, in lower part low, sulcate on whole length, lateral carinulae low, obtuse ; frons in profile strongly incurved ; compound eyes small, strongly convex, slightly oval ; ocelli vestigial ; head above with linear median carinula. Pronotum cylindrical ; median carina weak, linear ; lateral carinae hardly traceable as irregular wrinkles ; two sulci crossing dorsum ; metazona much shorter than prozona, with straight posterior margin, not covering mesonotum. Prosternal process short, almost square, with rounded apex and slightly raised anterior margin. Metasternal interspace distant from mesosternal one. Elytra, wings and tympanal organ absent. Anterior and middle legs short. Hind femur moderately narrow, compressed. External apical spine of hind tibia present. Arolium large. End of male abdomen inflated ; last abdominal tergite very large, inflated, its posterior margin incised and bilobate in middle ; supra-anal plate small, narrow angular, shorter than cerci ; cercus very large, incurved, basal part wide, apical part compressed and strongly widened, forming at lower apical part an attenuate angular projection and in upper part a very large, inverse axe-shaped projection ; subgenital plate short, subconical with obtuse apex. Female supra-anal plate angular, with obtuse apex ; cercus simple, short, compressed, angular ; subgenital plate trilobate, with angular lobes ; ovipositor moderately slender, with valves curved at apices.

Phallic complex : large, with dorsal part of ectophallic membrane and additional lateral lobes projecting upwards ; valves of cingulum large, complicatedly shaped, forming three lobes ; valves of penis curved ; basal valve strongly widened, forming large lateral projection ; apical valve slender, with acute apex. Epiphallus : bridge very large, almost square, poorly sclerotized disc merging with bridge ; lophi fused with the disc, with strong apical hooks ; dorso-lateral appendices slender, shorter than the disc, with curved, acute apices. Spermatheca with single, sac-like, but rather slender diverticulum.

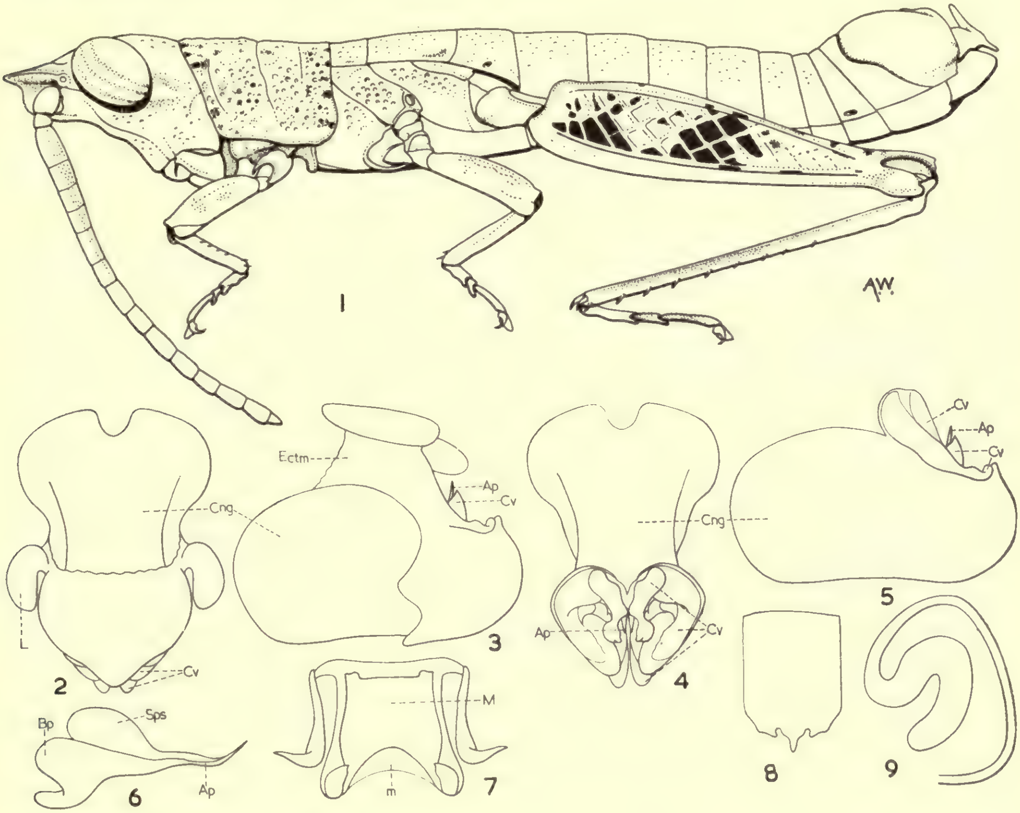

FIG. 25. *Pseudogeloius relictus* sp. n. ♂ type. 1, male. 2, phallic complex from above, epiphallus and part of ectophallic membrane removed ; L, lateral lobes of ectophallic membranes. 3, the same, lateral view. 4, phallic complex from above, with whole ectophallic membrane removed. 5, the same, lateral view. 6, penis and spermatophore sac. 7, epiphallus ; M, thicker membraneous part ; m, thinner membraneous part. 8, female subgenital plate. 9, spermatheca.

Type species : *Pseudogeloius relictus* sp. n.

Pseudogeloius is superficially very similar to the genus *Geloius*. It differs, however, very much by the structure of the last abdominal tergite in the male, by the peculiar structure of the male cercus, by the structure of the phallic complex and by the absence of teeth on the male anterior femora.

According to its general appearance it seems that the new genus ought to be referred to the *Geloius* Group in which it is placed tentatively. Other characters mentioned above, however, are so strikingly different that it is possible that they are not related at all. There is a possibility that similarities in general appearance of the two genera are due to convergence.

Pseudogeloius relictus **sp. n.**

(Text-figs. 25, 26)

♂ Type. Antenna 16-segmented. Fastigium of vertex angular, in profile angularly protruding, its sides in basal part excurved, fastigial suture long ; frontal ridge roundly protruding between antennae. Lateral lobes of pronotum longer than its height, with rounded angles. Mesosternal interspace longer than its width, its sides strongly incurved, lateral foveolae long and deep. Metasternal interspace forming X-shaped pattern. Abdomen rugose. Medial area of external side of hind femur forming rhomboidal pattern. Lower lobes of hind knee narrowed towards rounded apex.

General coloration brownish, with scattered small, brown spots ; external side of hind femur with irregular black pattern ; hind tibia brownish. Spiracles each surrounded by a black spot.

♀. Paratype. Much larger than the male. Antenna 15-segmented and more widened. Valves of ovipositor with acute curved apices ; external upper margin of upper valve serrated.

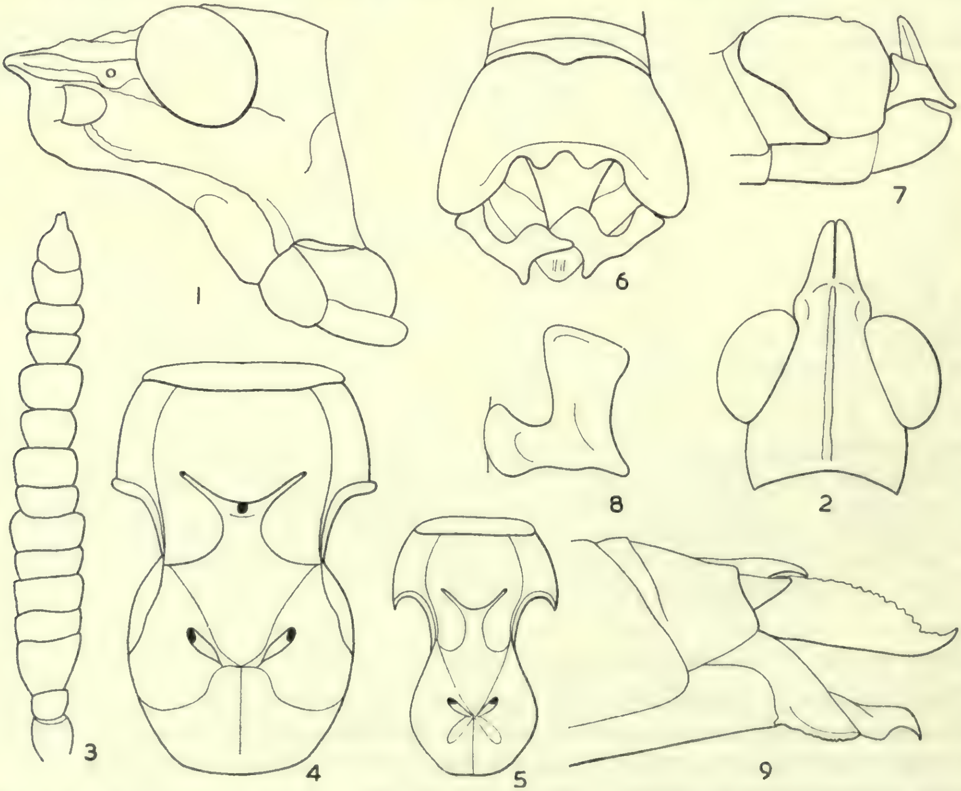

FIG. 26. *Pseudogeloius relictus* sp. n. 1, female head, lateral view. 2, male head from above. 3, female antenna. 4, meso- and metasternum, female. 5, the same, male. 6, end of abdomen, from above. 7, the same, lateral view. 8, male cercus, lateral and slightly posterior view. 9, female end of abdomen.

Coloration uniform brown ; internal side of hind femur ochraceous ; external side as whole body ; hind knee brown ; upper side of hind tibia ochraceous, lower side blackish. In other respects as the male.

Length of body ♂ 25·0–26·5, ♀ 39·0–46·5 ; pronotum ♂ 3·6–3·9, ♀ 5·6–5·8 ; hind femur ♂ 10·4–10·5, ♀ 14·5–15·0 mm.

Madagascar Est : Perinet, ii.1938, 2 ♂ (including type), 2 ♀ (Paratypes) (*A. Seyrig*). La Dakoa, 1 ♀ (Paratype) (*R. P. Cattala*).

Type and two female paratypes are in the Paris Museum. One male and one female paratypes are in the British Museum (Natural History).

SCHULTHESSIA I. Bolivar, 1905

From small to medium size. Body moderately ensiform. Integument rugose. Antenna thick, filiform, slightly compressed in basal part, shorter than head and pronotum together, their bases located in front of lateral ocelli. Head acutely conical, with a row of large, postocular tubercles ; fastigium of vertex elongated, angular ; apical fastigial areolae poorly developed ; frons strongly oblique, incurved ; frontal ridge low, narrow, shallowly sulcate. Oculus twice longer than its width ; ocelli of medium size. Pronotum elongate, widening backwards, dorsum narrow, flattened, crossed by two sulci ; median carina linear ; lateral carinae weak, present in prozona only ; metazona shorter than prozona, its posterior margin obtusangular ; lateral lobes of pronotum diverging from dorsum, lower margin straight, oblique, with a row of tubercles, posterior angles acute. Prosternal process cuneiform, its anterior surface concave. Mesosternal interspace wider than its length ; metasternal interspace transverse, distant from mesosternal. Elytra and wings fully developed, exceeding end of abdomen ; elytron narrow, tapering towards acute apex ; venation and reticulation dense. Tympanal organ fully developed. Coxa of middle leg on external side with two tubercles ; coxa of hind leg with one tubercle ; external, lower marginal area of hind femur widened and strongly displaced ventrally to medial area ; lower lobes of hind knee much shorter than upper ones ; hind tibia of normal shape ; external apical spine present ; hind tarsus slender, elongated. Arolium large. Male supra-anal plate elongate, angular ; cercus short, conical ; slightly upcurved subgenital plate conical, with obtuse apex. Ovipositor moderately slender, with curved valves ; subgenital plate trilobate.

Phallic complex : Cingulum elongate ; valve of cingulum short ; basal valve of penis strongly widened and downcurved ; apical valve wide with large dorsal appendix ; spermatophore sac large. Epiphallus with moderately long bridge ; lophi short, wide, with large hooks ; dorso-lateral appendices large, club-like, widened at apex.

Spermatheca with long, strongly twisted diverticulum, with numerous pockets.

Type species : *Schulthessia biplagiata* I. Bolivar, 1905.

This genus, according to the position of the antennae and the shape of the lower external area of hind femur, belongs to the same group as *Atractomorpha*. However, the phallic complex has a very different structure (Text-figs. 27, 28) which makes their close relationship rather unlikely. Possibly their external characters are convergent.

Schulthessia biplagiata I. Bolivar, 1905
(Text-fig. 27)

♂. Small. Antenna 15-segmented. Fastigium of vertex narrow angular, with parabolic apex ; fastigial furrow short ; carinulae of frontal ridge low, obtuse ; head above with longitudinal wrinkles. Dorsum of pronotum with longitudinal wrinkles and a few small tubercles, a pair of them in front of the first sulcus ; posterior margin of lateral lobe shallowly excised, posterior angle subacute ; episternum with angular apex and serrated anterior margin, lower lobes of hind knee angular. Last abdominal tergite with rounded excision. Supra-anal plate longer than cerci.

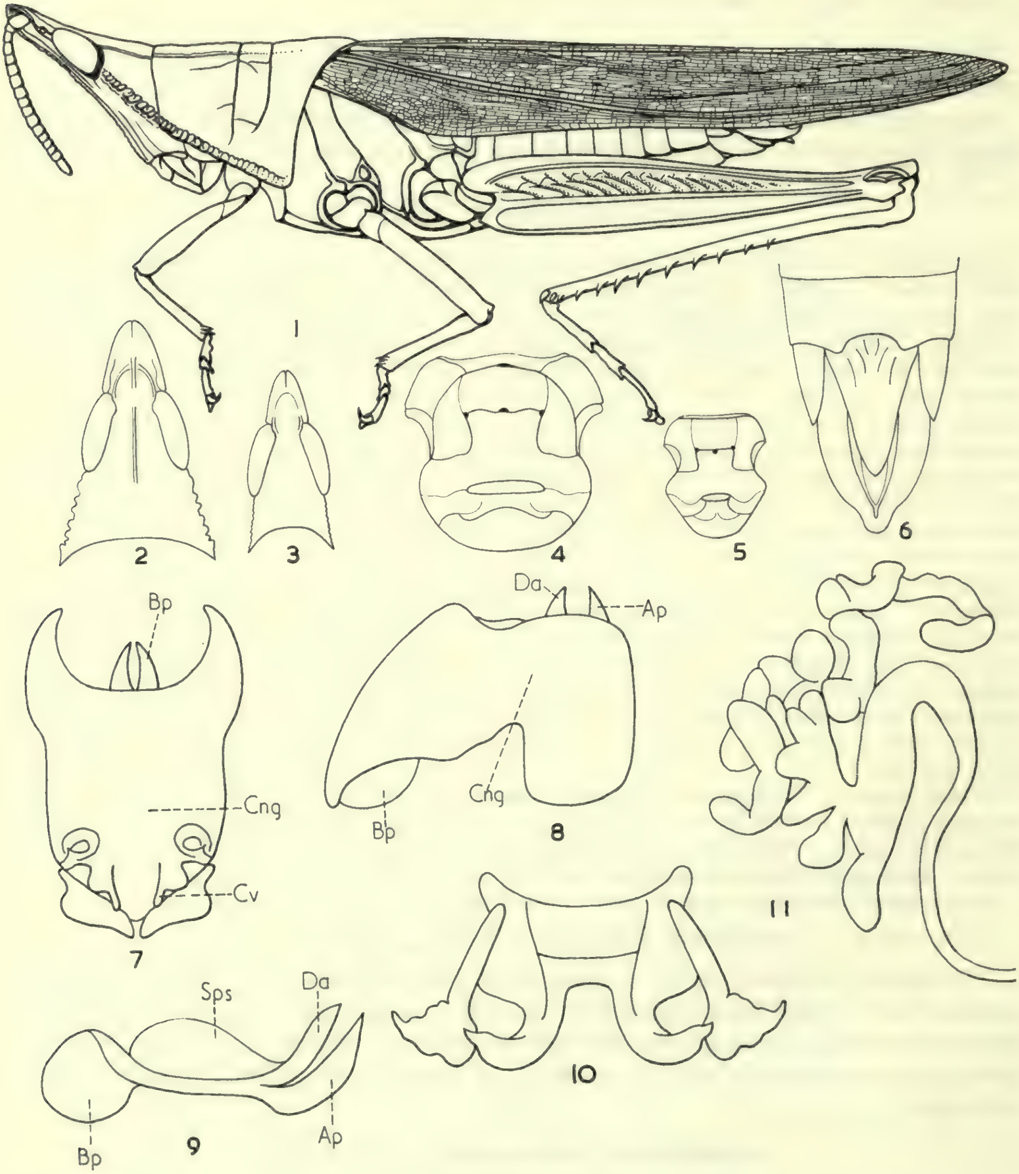

FIG. 27. *Schulthessia biplagiata* I. Bolivar, 1905. 1, female. 2, head from above, female 3, the same, male. 4, meso- and metasternum, female. 5, the same, male. 6, end of abdomen from above, male. 7, phallic complex from above, epiphallus and ectophallic membrane removed. 9, penis and spermatophore sac. 10, epiphallus. 11, spermatheca.

General coloration green or brownish ; internal side of third basal antennal segment with blackish or brown spot ; postocular and marginal rows of tubercles of lateral lobe of pronotum ochraceous ; lower edge of lateral lobe of pronotum red ; elytra and external side of hind femur with a few small, scattered reddish or brown spots ; hind wing raspberry-red ; hind tibia green.

♀. As the male, but larger, with body more fusiform. Antenna 16-segmented.

Length of body ♂ 20·0–22·2, ♀ 30·3–37·4 ; pronotum ♂ 4·0–4·3, ♀ 7·2–8·5 ; elytron ♂ 15·2–17·3, ♀ 23·7–28·0 ; hind femur ♂ 10·0–11·0, ♀ 15·5–17·0 mm.

This species is variable in body size and general coloration

Madagascar Nord : Nosy Komba, xi.1956, 1 ♀ (*G.R.*) ; Montagne d'Ambre, Les Roussettes 1,100 m. xi–xii.1958, 1 ♂ (*A. Robinson*).

Madagascar Nord-Ouest : Ampijoroa, Tsaramandroso, 2 ♀.

Madagascar Nord-Est : Ile Sainte-Marie, Ile aux Nattes, iii.1960, 1 ♂ (*A. Robinson*). Ile Sainte-Marie, Antanandava, iii.1960, 3 ♂, 2 ♀ (*A. Robinson*).

Madagascar Est : Ambila Lemaitso, iii.1951, 1 ♂, a ♀ (*A. Robinson*).

ATRACTOMORPHA Saussure, 1861

Perena Walker, 1870 : 506 ; I. Bolivar, 1905 : 196.

Small or medium size. Integument finely rugose. Antennae slightly compressed, shorter than head and pronotum together, their bases located in front of lateral ocelli. Head narrow, acutely conical, with a row of postocular tubercles ; fastigium of vertex elongated, flat, horizontal or slightly upcurved, with parabolic or angular apex ; fastigial areolae poorly developed ; frons strongly oblique, incurved ; frontal ridge narrow and low, shallowly sulcate, with obtuse lateral carinulae. Pronotum elongated, subcylindrical, slightly widening backwards ; dorsum slightly flattened, crossed by three fine sulci ; median and lateral carinae weak ; metazona much shorter than prozona, its posterior margin widely obtusangular, almost rounded ; lateral lobe with a row of lower marginal tubercles. Prosternal process cuneiform. Mesosternal interspace wider than its length, distant from metasternal interspace, which is transverse. Elytra and wings fully developed ; apex of elytron acutely attenuate. Tympanal organ well developed. Hind femur narrow, with external lower marginal area narrow, displaced ventrally to external medial area ; lower lobes of hind knee much shorter than upper ones. Male subgenital plate short, with rounded apex. Ovipositor moderately long and moderately robust, with valves curved at apices ; upper external margin of upper valve roughly serrated ; lower valve with external, lateral projection. Epiphallus with very long bridge widening in posterior part ; lophi represent widened part of bridge and are completely fused with it.

Type species : *Truxalis crenulatus* Fabricius, 1793.

Atractomorpha acutipennis (Guérin-Méneville, 1844)
(Text-fig. 28)

Truxalis (*Pyrgomorpha*) *acutipennis* Guérin-Méneville, 1844 : 340.
Atractomorpha gerstaeckeri I. Bolivar, 1844 : 66 ; Banerjee & Kevan, 1960 : 183.
Atractomorpha aurivillii I. Bolivar, 1844 : 67 ; Banerjee & Kevan, 1960 : 183.
Atractomorpha congensis Saussure, 1893 : 581 (nom. nud.) ; Kevan, 1960 : 40.
Atractomorpha hova Saussure, 1899 : 640 ; Banerjee & Kevan, 1960 : 182.
P[yrgomorpha] madagascariensis Blanchard ; I. Bolivar, 1905 : 209 (nom. nud.) Banerjee & Kevan, 1960 : 183.
Atractomorpha madacassis Bruner, 1910 : 628 ; Banerjee & Kevan, 1960 : 183.
Atractomorpha acutipennis (Guérin-Méneville, 1844) ; Kirby, 1910 : 332.
Atractomorpha brevis Uvarov, 1938 : 274, 280 ; Banerjee & Kevan, 1960 : 184.

Atractomorpha externa Bey-Bienko, 1949 ; Banerjee & Kevan, 1960 : 184.
Atractomorpha acutipennis gerstaeckeri I. Bolivar, 1884 ; Banerjee & Kevan, 1960 : 183, **syn. n.**
Atractomorpha acutipennis brevis Uvarov, 1938 ; Banerjee & Kevan, 1960 : 184, **syn. n.**

♂. Antenna 16 or 17-segmented. Eyes elongated oval ; ocelli large. Pronotum tuberculate, particularly along weak lateral carinae ; posterior margin of lateral lobe deeply and widely excised ; posterior angle acute ; episternum with angular apex and serrated anterior margin.

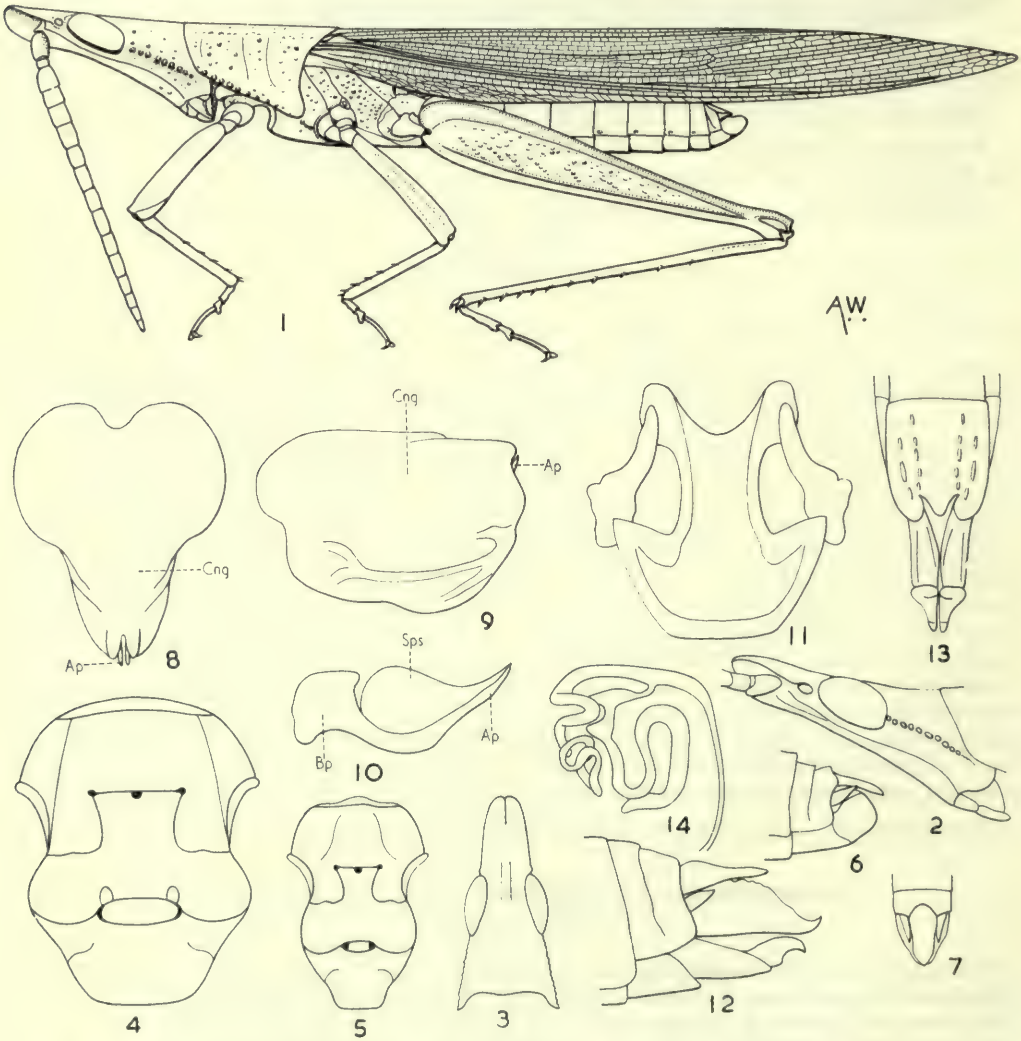

FIG. 28. *Atractomorpha acutipennis* (Guérin-Méneville, 1844). 1, male. 2, head of female, lateral view. 3, head of male from above. 4, meso- and metasternum, female. 5, the same, male. 6, end of male abdomen, lateral view. 7, the same, from above. 8, phallic complex from above, epiphallus and ectophallic membrane removed. 9, the same, lateral view. 10, penis and spermatophore sac. 11, epiphallus. 12, end of female abdomen, lateral view. 13, the same, from below. 14, spermatheca.

Lower lobes of hind knee angular. Last abdominal tergite in middle with rounded excision. Supra-anal plate longer than cerci.

Phallic complex : cingulum pear-shaped, with considerably widened basal part ; valve of cingulum short ; valves of penis curved ; basal valve strongly widened ; apical valve slender, upcurved. Spermatophore sac very large. Epiphallus with bridge slender in anterior and strongly widened in posterior part.

General coloration uniformly green or brownish ; hind wing in basal part pink.

♀. Larger than the male ; body less slender. Antenna 16-segmented. Subgenital plate with trilobate apex and two pairs of rows of small, lateral tubercles.

Spermatheca with two long vermicular diverticula. In other respects as the male.

Length of body ♂ 19·0–25·0, ♀ 28·0–39·8 ; pronotum ♂ 4·0–5·1, ♀ 6·2–9·0 ; elytron ♂ 18·6–24·0, ♀ 24·0–35·2 ; hind femur ♂ 8·7–10·9, ♀ 13·3–17·0 mm. (The measurements are based on Madagascar material only.)

Banerjee and Kevan (1960) made a preliminary revision of the genus *Atractomorpha* and established the synonymy of its species. They recognized three subspecies of *Atractomorpha acutipennis* (Guérin), namely *A. acutipennis acutipennis* (Guérin) confined to Madagascar only, *A. acutipennis gerstaeckeri* I. Bolivar distributed in Central Africa and Comoro Is., and *A. acutipennis brevis* Uvarov distributed in Sudan, Ethiopia, S.W. Arabia, Persia and Afghanistan. However, when a large amount of material of all three subspecies was studied, it was found that the series of specimens of every subspecies fits very well into the series of any other subspecies, and if the locality labels were ignored, it would not be possible to divide them into subspecies. The only solution at this stage of our knowledge of the genus *Atractomorpha* is to disregard these subspecies.

It is well known, and has been repeated in the literature, that a greater range of variability of the species of *Atractomorpha* exists. In the case of *A. acutipennis* the variability manifests itself in size and slenderness of body, length and degree of acuteness of elytra, and in length and partly in shape of the fastigium of the vertex. The membranous area near the posterior margin of the lateral lobe of the pronotum, mentioned by Banerjee and Kevan (1960) as a specific character, is also variable and in many specimens is not detectable.

Madagascar Nord-Ouest : Sitampiky, vii.1947, 1 ♂ (J.D.) ; Ampijoroa, Tsaramandropo, 2 ♀.

Madagascar Ouest : Ankavandra, vii.1949, 1 ♂ (*R. Paulian*).

Madagascar Nord-Est : Ile Sainte-Marie, Ambatoroa, v.1959, 1 ♀ (*Razafimandimby*).

Madagascar Centre : dct. de Miarinarive, Fidasiana, viii.1958, 1 ♀, (*A. Robinson*) ; Tananarive, Tsimbazaza, 1 ♂, 2 ♀.

Madagascar Sud-Ouest : Lambomakandro, 500 m., Tuléar, vii.1957, 1 ♂ (*A. Robinson*) ; Tongobory, Sept-Lacs, 1 ♂ (*A. Robinson*).

Madagascar Est : Périnet (Sahamaloto) 13–17.i.1949, 1 ♀ ; Station Agricole, Brickaville, 1 ♂, 2 ♀ ; Fampanambo, 25 m., dct. Maroantsetra, iii.1958, 1 ♂, 2 ♀ (*Soga, Raharisonima*).

UHAGONIA I. Bolivar, 1905

Of medium size. Body strongly fusiform. Integument finely granulose. Antenna filiform, much shorter than head and pronotum together, located in front of lateral ocelli. Head acutely conical ; fastigium of vertex angular ; frons oblique, straight ; frontal ridge below antennae almost obliterated ; between and in front of antennae projecting forwards, with tuberculate lateral carinulae and protruding apex ending with tubercle ; in front, before merging with fastigium of vertex, it forms deep excision ; compound eyes small ; ocelli hardly detectable. Pronotum subcylindrical, widening backwards, median carina weak ; dorsum crossed by three sulci ; metazona about one third of length of prozona, its posterior margin straight or slightly incurved. Prosternal process collar-like, or tongue-like, projecting in middle. Mesosternal interspace short and wide ; metasternal interspace very wide, slit-like, distant from mesosternal one. Elytra strongly reduced or absent ; tympanal organ absent. Anterior and middle femora on external side slightly tuberculate ; hind femur with very narrow upper external area ; lower external area widened and displaced ventrally to medial area. External apical spine of hind tibia present ; hind tarsus elongated, slender. Arolium large. Supra-anal plate elongate angular, with transverse median sulcus ; cercus compressed, short, angular ; ovipositor elongated, slender ; valves straight, slightly curved at apices ; subgenital plate in middle with narrow angular projection.

Type species : *Uhagonia sphenarioides* I. Bolivar, 1905.

KEY TO SPECIES

1 (2) Strongly reduced elytra present, wings absent. Fastigium of vertex about twice as long as longest diameter of eye . . . ***sphenarioides*** I. Bolivar
2 (1) Elytra and wings absent. Fastigium of vertex as long as longest diameter of eye . . . . ***depressa*** sp. n.

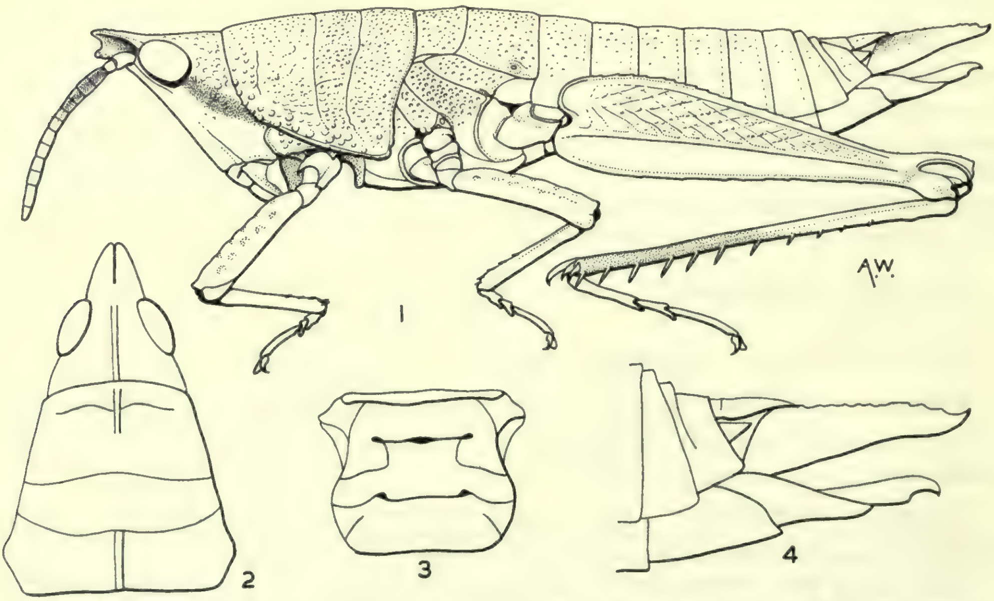

FIG. 29. *Uhagonia depressa* sp. n. ♀ type. 1, female. 2, head and pronotum from above 3, meso- and metasternum. 4, end of abdomen.

Uhagonia sphenarioides I. Bolivar, 1905

♀. Type. (Redescription.) Body fusiform. Antenna 13-segmented. Fastigium of vertex acutely angular, about twice as long as longest diameter of eye ; fastigial furrow long ; carinula of vertex hardly detectable. Posterior margin of metazona of pronotum almost straight, with small incision in middle ; lateral lobe of pronotum longer than its height, lower margin straight, oblique. Elytra strongly reduced, reaching middle of metanotum, of oval form, with lateral margins inflated and with oval, bladder-like inflation in middle ; venation obliterated ; wings absent. Upper carina of hind femur roughly serrated. Ovipositor long and slender ; external margin of upper valve irregularly serrated.

General coloration probably greenish (the specimen is discoloured by previous preservation in liquid) ; margins of elytron blackish, middle inflation brown.

Length of body 42·0 ; pronotum 7·8 ; elytron 1·8 ; hind femur 18·0.

Type locality : Madagascar. Type in the Vienna Museum.

Uhagonia depressa **sp. n.**

(Text-fig. 29)

♀ Type. Antenna 13-segmented. Fastigium of vertex strongly granulose, as long as longest diameter of eye ; carinula of vertex present. Lateral lobe of pronotum longer than its height, lower margin oblique. Mesosternal interspace about three times as wide as its length. Elytra and wings absent. Upper carina of hind femur serrated. Upper external margin of upper valve of ovipositor roughly serrated.

General coloration uniformly light olive-green ; apical two thirds of hind tibia and tarsus bright red. Male unknown.

Length of body, 30·5 ; pronotum 6·7 ; hind femur 15·2 mm.

Madagascar Est : Dct. Sambava, R.N. xii, Marojejy, Ambatosoratra 1,700 m., xi.1960, 1 ♀, type (*P. Soga*).

Type in Paris Museum.

LIST OF SPECIES RECORDED FROM MADAGASCAR BUT NOT FOUND IN THE MATERIAL STUDIED

Phymateus morbillosus (Linnaeus, 1758)

There is only one record for this African species from Madagascar by Walker, 1870. Probably it is the result of a misidentification, as *Ph. morbillosus* has never since been recorded from Madagascar. The record should probably be referred to *Phymateus saxosus* Coq.

Rutidoderes squarrosus (Linnaeus, 1771)

Walker's (1870) record for this species from Madagascar is also likely to be a result of misidentification. The species has never been recorded since. The record probably ought to be referred to *Phymateus madegassus* Karsch.

Zonocerus hova Saussure, 1899

This species is a synonym of *Zonocerus elegans* (Thunberg, 1815), and was erroneously recorded from Madagascar (see Dirsh, 1961).

Buyssoniella madecassa I. Bolivar, 1905

This genus and species was described from Madagascar and placed by I. Bolivar in the subfamily *Atractomorphinae*.

Since his description it has never been recorded again and the type is lost. The description is so inadequate that it is not possible to decide the real identity of the genus and species or its interrelation with other genera and species, except that it belongs to the " group *Atractomorphae* ".

ADDENDUM

Ixalidium haematoscelis Gerstaecker, 1869

This species of the subfamily *Catantopinae*, described and many times recorded from East Africa, was recorded from Madagascar by Bruner, 1910. Most probably the record is erroneous and ought to be referred to one of the genera and species near the genus *Serpusilla*.

ACKNOWLEGEMENT.

I wish to express my sincere gratitude to Professor D. Keith McE. Kevan for reading the manuscript, for valuable comments and for helping to locate the types of *Uhagonia sphenarioides* and *Phymateus saxosus*.

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SPECIES-GROUPS IN CTENOPHTHALMUS (SIPHONAPTERA: HYSTRICHOPSYLLIDAE)

F. G. A. M. SMIT

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
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F. G. A. M. SMIT

British Museum (Natural History)

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SYNOPSIS

The genus *Ctenophthalmus* is divided into 20 species-groups (with 19 subgroups) which are defined and the species listed under each ; a list of synonyms and other nomenclatural changes is also given.

INTRODUCTION

Ctenophthalmus Kolenati, 1856, containing some 170 species and subspecies (81 monotypic and 22 polytypic species) or nearly 10 per cent of all known fleas, is the largest genus of Siphonaptera. It would, therefore, be desirable to divide the genus into smaller units in order to group the various taxa phylogenetically and to facilitate identification of the species. In 1940, when the number of described forms was 94, Wagner (*Z. Parasitenk.* 11 : 593–606) divided *Ctenophthalmus* into five genera (one consisting of two subgenera) on the study of the then known 46 Palaearctic species (30 monotypic and 16 polytypic) only. Smit (1953, *Entomologist*, 86 : 21) remarked that " Since it is preferable to stress the relationships of all members of this group, and considering the characters used by Wagner for the division, it would be better to regard his proposed genera as subgenera ; in this category they will serve a useful purpose because the number of species contained in the genus *Ctenophthalmus* s. l. is so large that subdivision of the genus is most desirable on grounds of convenience ". Wagner's generic concepts have been generally accepted in the sense of subgenera. Russian authors (*e.g.* Ioff & Scalon, 1954, *Fleas of Eastern Siberia :* 105) also state that Wagner's genera should at most be given subgeneric rank, although Ioff & Scalon (*op. cit.*) (and Ioff & Tiflov, 1954, *Key to Aphaniptera of S.E. U.S.S.R. :* 87) refer to the subgeneric names as those of groups.

I had tried to continue where Wagner left off, assuming that it would be feasible to erect some more subgenera for the species which Wagner had not dealt with or which had not been described at the time, but all I have been able to do is to form 20 species-groups (with 19 subgroups) which presumably represent phylogenetic units ; 11 Ethiopian species are left as an ungroupable residue. The neutral term " group " is used to indicate a number of related taxonomic units or a single species which is markedly different from other species ; it does not refer to a formal category and has therefore no nomenclatural significance. One could of course regard these species-groups as subgenera, but my objections to this are that (*a*) with the constant discovery of new species a number of the groups, as defined below, may have to be altered to a greater or lesser degree ; (*b*) by assigning a subgeneric name and a type-species to a unit, one fixes its status more firmly than by referring to it as a species-group ; any alteration in the concepts of units, if used as subgenera, may give rise to nomenclatural difficulties ; (*c*) ideally the members of a subgenus should form a " natural " group, but we know as yet too little about the various species to ascertain that the units conform to this requirement.

To define units within a large genus like *Ctenophthalmus* is not easy, for one has to decide what actually constitutes a character of fundamental phylogenetic importance. As various characters may come into that category, the question is which to regard as being of prime importance. To base a division on one character only is obviously inadvisable, for one could arrive at three quite different units by using characters A, B or C. However, within the genus *Ctenophthalmus* there is no correlation of two or more characters which may be regarded as fundamental, and it is therefore not possible to form a relatively small number of major groups (subgenera). Some examples are : (*a*) all Ethiopian species possess an area communis in both sexes and a pronotal ctenidium of 16 spines—the same is true for members of the unrelated *agyrtes*-group, but the latter have an occipital chaetotaxy which is different from that of all Ethiopian species except *vanhoofi;* (*b*) all Ethiopian species lack a curved seta at the apex of the labial palp but this is also the case in the unrelated *fissurus*- and *rettigi*-groups ; (*c*) the development of the mid-coxal sulcus is normally a generic character but in *Ctenophthalmus* the sulcus may be complete, slightly interrupted or entirely interrupted.

When a member of a group takes to an ecological niche or mode of life which is very different from that occupied by the other members of the group, and as a result undergoes more or less drastic morphological changes, the relationships between this member and the others of the group tend to be obscured. Fleas of fossorial mammals, for example members of the *gratus*-subgroup (*assimilis*-group), illustrate this very clearly. The structure of the genitalia leaves no doubt that the *gratus* forms, which have become associated with mole-rats (*Spalax*), belong to the *assimilis*-group (Figs. 87, 147*, *cf.* Figs. 85, 86, 146), but they differ from all other members of that group, which are parasites of Microtinae, by having on terga II–VII rounded spiracular fossae (Fig. 35) like those in other, but unrelated, species which are parasitic on *Spalax* ; and a much reduced and almost Y-shaped spiracular fossa on tergum VIII (Fig. 35) (a reduction has also taken place in *congener tenuistigmatus*, a parasite of *Microtus*). Furthermore, fleas of *Spalax* are more hairy than those of other hosts, and members of the *gratus*-subgroup are likewise more setose, though less completely so, but instead of having more setae, for example, in the tergal main rows, a short row of setae occurs on the pronotum anterior to the main row (in all other species of the genus there is only one pronotal row of setae) and a rudimentary fourth genal spine, variable in size but smaller than the normal spines, is present in a number of specimens (Figs. 9, 10)—a very exceptional development. The *gratus*-subgroup shows, for example, that the use of the shape of the spiracular fossae as a principal unit-character may give misleading results if insufficient attention is paid to the affinities of the genitalia.

The influence of a change of ecological niche on the morphology of the flea appears to affect the head, thorax and pregenital abdominal segments much more immediately than the genitalia. Of the male genitalia the phallosome seems more liable to morphological changes than segment IX (although there are some exceptions). In the female, the shape and especially the chaetotaxy of tergum VIII are apparently more stable than the structure of the genitalia, although variations in the genitalia are far less obvious than those of the male.

This paper is not a revision and only species showing certain group characteristics have been illustrated. The genus will be fully dealt with by Hopkins & Rothschild in the *Catalogue of the Rothschild Collection of Fleas*, **4**, where keys will also be given. I have not been able to examine the faunistic literature to the full extent and the geographical ranges given for each species may not always be exhaustive.

I have not seen specimens of the following : ♀ of *arcanus* Smit ; *bifurcus* Ioff ; *caballeroi* Barrera ; *chionomydis* Ioff & Rostigayev ; ♂ of *crudelis* Jordan ; ♂ of *dinormus* Jordan ; ♂ of *engis* Rothschild ; *expansus* Traub ; ♀ of *hispanicus* Jordan ; *hypanis s. l.* ; *kazbek* Tiflov ; *kirschenblatti* Argyropulo ; ♀ of *nyikensis* Smit ; ♂ of *olbius* Jordan & Rothschild ; *quadratus* Liu & Wu ; *shovi* Rostigayev ; ♀ of *stenurus* Jordan ; ♀ of *tertius* Smit ; *wladimiri* Isayeva-Gurvich ; ♀ of *yunnanus* Jordan.

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* Figures referred to in the text are contained in Plates 1–58 at the end of this number.

CHARACTERS OF TAXONOMIC IMPORTANCE

HEAD

1. *Thickness of frontal wall*—usually thin (Figs. 1, 3, 11), but often thicker in fleas parasitizing fossorial rodents, *i.e.* members of *spalacis-*, *caucasicus-*, *triodontus*-groups (Figs. 4, 13).

2. *Frontal wall with small seta in notch just above oral angle*—this is present in *moratus*-group (Fig. 12) and occasionally (though not as distinctly) in species of other groups (Figs. 13, 14, 15).

3. *Development of eye*—the eye is vestigial in parasites of fossorial hosts and here belong *e.g.* members of the *spalacis-*, *triodontus-*, *dilatatus*-groups and of the *gratus*-subgroup (*assimilis*-group) (Figs. 4, 9, 10, 13). In the majority of species the eye is distinct (Figs. 1, 3) and in Ethiopian species (except *triodontus*-group) the eye is usually relatively well developed and dark (Fig. 12).

4. *Length of labial palp*—this palp is shortest, reaching to about the middle of the fore coxa, in some African species (*particularis*, *stenurus*, *tertius*, *lycosius*) ; the palp reaches to about two-thirds the length of fore coxa in all other African species and in *assimilis*-group, to three-quarters the length in all other species except for *nivalis-* and *golovi*-subgroups (*nivalis*-group), *dolichus-*, *spalacis-* and *triodontus*-groups in which the palp reaches to the apex, and in *dolomydis*-subgroup (*nivalis*-group) and *dilatatus*-group in which it reaches well beyond apex of fore coxa.

5. *Chaetotaxy and shape of apical segment of labial palp*—this segment bears ventro-anteriorly three very small setae the middle one of which is directed posteriorly in all species which have a ventro-posterior hooked seta (Figs. 20–24) ; the lower of these three setae is often fairly stout in members of the *assimilis*-group (Figs. 22, 23) ; the upper seta points downwards except in members of *spalacis-*, *fissurus-*, *rettigi*-groups and of all Ethiopian groups, in which this seta points forwards and downwards (Figs. 24–28). This segment bears ventro-posteriorly either two or three setae : when there are two setae, the upper is relatively well developed and hook-shaped while the lower seta placed immediately below the hook-shaped one is extremely minute and often barely visible even at ×1000 magnification (Figs. 20–24). These two setae occur in all Holarctic species with the exception of members of *fissurus-* and *rettigi*-groups (Fig. 25) ; when three bristles are present as in *fissurus-*, *rettigi-* and all Ethiopian groups (Figs. 25–28), the two upper ones are short and straight or almost so, while the lower seta is usually somewhat longer and more distinct than the corresponding one in the species with only two ventro-apical setae. In the species with a hooked ventro-posterior seta the apex of the segment is usually triangular (Figs. 20–24), in those with unmodified setae the apex is obtuse (Figs. 25–28).

6. *Presence or absence of an area communis*—this is a pale ovoid area where the walls of the antennal fossae of the two sides are partly fused (Fig. 18) ; this incipient trabecula centralis is situated behind the middle of the antenna and is usually rather difficult to see, even in well cleared specimens. The area communis is absent in both sexes of the *parcus*-group, present in females of all other groups and in males of the *agyrtes*-group, *russulae*-subgroup (*nivalis*-group), *rettigi*-group and all Ethiopian groups.

7. *Occipital rows of setae*—the first of the three rows consists of two setae in the Holarctic species (Figs. 1, 2, 3 ,11) except in members of the *spalacis*-group which may have only one seta, in *dux*-group where sometimes three setae are present, and in the following Ethiopian species : *cophurus, eximius, vanhoofi* and *particularis* (Fig. 18) (in some other Ethiopian species this row may also consist of only two setae but then the number usually fluctuates between two and four). The middle row consists of two small upper setae and one large seta, well separated from the upper ones, in one Ethiopian species (*vanhoofi*) and in Holarctic species (Figs. 1, 2) with the exception of the *rettigi-, dilatatus*-groups (Figs. 3, 11) and *inornatus*-subgroup (*fissurus*-group) in which this row consists of two rather closely set setae as is also the case in *particularis* (Fig. 18), and in the *spalacis*-group (Fig. 4) where the number varies from 2–4, while there is only one seta in *fissurus* and *turcicus* ; in the *caucasicus*-group the three setae of the middle row are equally spaced; in the Ethiopian species (with the exception of *vanhoofi* and *particularis*) the middle row consists of 3–5 setae which form a distinct row (Figs. 12, 13). The posterior row consists of five (occasionally 4–7) setae of which the lowest is the longest.

8. *Genal spines*—first (anterior) genal spine always with parallel striation (Figs. 1–18), second and third spines either with oblique (Figs. 1, 3, 6–8, 12) or parallel striation. The latter type of spine occurs only in *dolomydis* (Figs. 2, 5), *dilatatus* (Fig. 11), *turcicus* and *fissurus.* A type of striation (of middle and posterior genal spines) which is intermediate between the parallel and oblique types is found in *gratus* (Figs. 9, 10), *dux, inornatus,* and the *spalacis*-group (Fig. 4). The ratio of length between the three spines is on average 1 : 1·3 : 1·6.

The spines are usually sharply pointed but in parasites of fossorial rodents (*Spalax, Tachyoryctes*) they often have rounded tips (Fig. 13) ; these spines are frequently broken off in varying degrees in those fleas.

THORAX

9. *Length of pronotum*—the pronotum is dorsally shorter than the pronotal spines in *dolomydis* (Fig. 2) and *dilatatus,* about as long as these spines in the *spalacis-, caucasicus-, fissurus-, moratus-* and *rettigi*-groups (Fig. 3) as well as in *gratus* and *olbius ;* in all other species the pronotum is at least somewhat longer than the pronotal spines.

10. *Rows of setae on pronotum*—there is only one row of pronotal setae but in the *gratus*-subgroup an incipient short row may be present in front of the main row.

11. *Number of spines in pronotal ctenidium*—there are usually 14, 16 or 18 spines in the pronotal ctenidium ; in *particularis* (Figs. 18, 19) there are only 12 spines but in this species the ctenidium is modified. There are 14 spines in both sexes of *dilatatus* and *dolichus*, 16 in male 14 in female in *caucasicus-, dux-* and *pseudagyrtes*-groups, 16 spines in *agyrtes*-group, *russulae*-subgroup (*nivalis*-group), *spalacis-* and all Ethiopian groups (except *particularis*) ; 18 spines in male 16 in female in *assimilis* and *nivalis*-groups (except *russulae*-subgroup) ; 18 spines in both sexes in *rettigi-* and *parcus*-group and in the *inornatus*-subgroup (*fissurus*-group).

12. *Arrangement of pseudosetae under mesonotal collar*—in most species there are three mesonotal pseudosetae on each side, the upper two of which are placed near the dorsum and the lower a little below the middle of the collar (Fig. 42). A different, but not always constant, arrangement is found in the *caucasicus-*, *dolichus-*, *dilatatus-*, *triodontus-*, *particularis*-groups (Figs. 43–45) and in the *gratus*-subgroup (*assimilis*-group).

13. *Chaetotaxy of metepimeron*—in the majority of species there are about half-a-dozen setae on the metepimeron but in *turcicus* and members of the *spalacis-* and *triodontus*-groups the number of setae is usually larger (up to about a dozen).

LEGS

14. *Oblique sulcus of mid coxa*—the sulcus is (*a*) complete (Fig. 29) in members of the *agyrtes-*, *dolichus-*, *pseudagyrtes-* and all Ethiopian groups (except *eximius*) ; (*b*) interrupted in the middle in various degrees (Fig. 31) in *spalacis-*, *rettigi-*, *triodontus-* and *eximius*-groups, in *fissurus*-subgroup (*fissurus*-group) and sometimes in specimens of *gratus*-group ; (*c*) broken in upper part, forming double lines (Fig. 30) as in *nivalis-* and *dolomydis*-subgroups (*nivalis*-group), some subgroups of *assimilis*-group, *caucasicus-*, *dilatatus-*, *dux-*, *inornatus-* and *parcus*-groups.

15. *Number of setal notches in hind tibial margin*—the dorso-posterior margin of the hind tibia has seven notches, each normally bearing two setae in all species except in members of the *triodontus*-group which usually have eight (occasionally even nine) because of an extra notch between the penultimate one and the notch above it.

16. *Length of longest apical seta of second hind tarsal segment*—the length of this seta varies, according to species, from not quite extending to the apex of the third segment to reaching beyond the apex of the fourth segment.

17. *Number of lateral setae of fifth hind tarsal segment*—there are (*a*) three pairs of lateral plantar setae on the fifth hind tarsal segment in the majority of Holarctic species and in two Ethiopian species (*eximius*, *arcanus*) ; (*b*) three or four pairs—or three setae on one side of the segment and four on the other—in the *spalacis-* and *triodontus*-groups and in the following Ethiopian species : *lycosius*, *singularis*, *evidens*, *bacopus*, *ansorgei*, *calceatus*, *ominosus*, *debrauwerei* and *luberensis ;* (*c*) four pairs in *dux*-group, *expansus and caballeroi* (*pseudagyrtes*-group) and in all Ethiopian species except the ones mentioned under (*a*) and (*b*).

ABDOMEN

18. *Smoothness of pregenital abdominal segments*—the posterior margins of terga I–VII and especially of sterna II–VII are very minutely and rather sparsely serrated in members of the *evidens*-group and in *engis*, *eximius* and *cophurus*. In all other species of the genus these margins are smooth.

19. *Downward extension of main rows of tergal setae*—in the majority of species only one seta (the lowest) of the main row on each of terga II–VII is situated below the level of the spiracular fossa ; exceptions are members of the *caucasicus-*, *fissurus-*, *spalacis-*, *triodontus-* and *dilatatus*-groups in which usually two (sometimes three or —in *triodontus*-group—even four) setae extend below the level of spiracular fossa at least on terga III and IV (usually on terga II–VII or VI).

20. *Numbers of antesensilial setae*—both sexes have three antesensilial setae on each side except for *eximius* which has three setae in the male but usually four (not infrequently three or five on one or even both sides) in the female.

21. *Presence or absence of lateral setae on basal sternum*—the basal sternum has a small number of lateral setae in both sexes of the following : *spalacis*- and *dux*-groups, *dolomydis*-subgroup and in *golovi*, *turcicus* and *stenurus* (♂), also in an occasional specimen of *eumeces ;* this patch of setae is found in the female sex only in members of the *caucasicus*- and *rettigi*-groups and in *parvus*, *iranus*, *singularis*, *eximius*, *audax* and *edwardsi*.

22. *Pattern of striation of basal sternum*—the cuticular ridges of this sternum may form (*a*) a parallel pattern as in *golovi*-subgroup (*nivalis*-group), most members of *assimilis*-group, *parcus*-, *dolichus*-, *spalacis*-, *caucasicus*-, *fissurus*-, *dux*-, *rettigi*-, *pseudagyrtes*-, *atomus*-, *calceatus*- and *eximius*-groups and in *cophurus*, *eumeces* and *stenurus ;* (*b*) finger-print pattern which occurs only in the following Ethiopian species : *triodontus*-group and in *atomus*, *olbius*, *smithersi*, *singularis*, *blandulus*, *phyris*, *devignati*, *vanhoofi*, *bacopus*, *debrauwerei*, *luberensis* and *arcanus ;* (*c*) a pattern which is intermediate between a parallel and finger-print one and in which the centre of the lateral surface of the sternum somewhat resembles a honeycomb—this is found in all species other than those mentioned under (*a*) and (*b*).

23. *Shape of spiracular fossae*—the shape of the spiracular fossa of the metepimeron corresponds on the whole with that of terga II–VII but it is always larger ; the fossa of tergum VIII is—as in all fleas—different from the ones on the preceding terga. The following main types of fossae on metepimeron and terga II–VII can be distinguished : (*a*) circular or broad oval—these are found in the *caucasicus*-, *spalacis*-, *fissurus*-, *triodontus*- and *rettigi*-groups and in the *gratus*-subgroup (*assimilis*-group) (Figs. 35, 36, 37, 41) ; (*b*) elongate, rounded apically and of subequal width over entire length—in *dux*-group (Fig. 40) ; (*c*) elongate, with a widened rounded apical part—in *dolic.hus*-group (Fig. 38) ; (*d*) halter-shaped in *dilatatus*-group (Fig. 39) ; (*e*) co nical, *i.e* pointed posteriorly—in all other groups (Figs. 32–34).

The fossa of tergum VIII is usually a Y- or V-shaped structure (Figs. 32–33), but much broadened in members of the *assimilis*-group (Fig. 34c, f) (except the *gratus*-subgroup (Fig. 35c, f), *congener tenuistigmatus* and *pisticus*-subgroup).

MALE

24. *Setae anterior to spiracular fossa of tergum VIII*—one or a few more setae are present in about 20 per cent of the known species but this occurrence is not a group character.

25. *Shape of sternum VIII*—the margin of sternum VIII is (*a*) ventrally emarginate, *e.g.* in the *nivalis*- and *rettigi*-groups (Figs. 48–50, 52) and in *acanthurus ;* (*b*) ventroposteriorly drawn out into a triangular lobe in the *pseudagyrtes*-group (Fig. 53), *eximius* and *cophurus ;* (*c*) of unusual shape as shown in figures of *capriciosus* (Fig. 62), *pisticus* (Fig. 57), *dolichus* (Fig. 55), *dilatatus* (Fig. 61) and *dux* (Fig. 63) ; (*d*) in all other species sternum VIII has a broadly rounded or obtuse posterior margin ; (*e*) in *calceatus* and *ansorgei* (*calceatus*-group) the ventral margin has the appearance of being partially folded over (Fig. 59).

26. *Presence or absence of area fusoria*—the area fusoria is a triangular or semicircular dorsal area of fusion of the two sides of the apodeme of tergum IX in male fleas (Fig 64, a.f.) ; it is absent in the *agyrtes-*, *caucasicus-*, *dolichus-*, *pseudagyrtes-*, *rettigi-* and *eximius*-groups and in *cophurus*, *ominosus*, *calceatus* and *ansorgei*. In all other species the area fusoria is developed to a greater or lesser degree.

27. *Internal ventral incrassation of corpus of clasper* (Fig. 64, v.i.)—this incrassation is (*a*) absent in *caucasicus-*, *parcus-*, *dux-*, *dilatatus-* and *dolichus*-groups and in *inornatus*, *pollex*, *acanthurus*, *eximius* and *debrauwerei ;* (*b*) long, narrow and horizontal in *agyrtes-*, *spalacis-* and *triodontus*-groups and in *pisticus ;* (*c*) triangular in *assimilis-*, *nivalis-*, *pseudagyrtes-* and *moratus*-groups and in *evidens*, *atomus*, *vanhoofi*, *cophurus* and *luberensis ;* (*d*) narrow and upright in *rettigi-*, *calceatus-* and *eumeces*-groups and in *turcicus*, *ominosus*, *singularis*, *phyris* and *devignati*.

28. *Acetabular process*—in the *atomus*-group this process is large and hyaline (Text-fig. 112), in all other species of the genus it is not or not markedly differentiated from the rest of the corpus of clasper.

29. *Shape and chaetotaxy of fixed process of clasper*—this process is either entire or divided by a sinus into two lobes, the lower (ventral) of which may also be sinuate. An undivided (or almost so) process is only found in members of the *fissurus-* and *rettigi*-groups (Figs. 100, 101, 105, 106) and in a number of Ethiopian species (Figs. 108–110, 113, 118, 121). In all other species the fixed process is sinuate in various degrees and in a number of forms of the *agyrtes*-group as well as in *bifurcus* (*nivalis*-group) the lower lobe is also sinuate (Figs. 73, 77, 78).

Chaetotaxy : There is usually only one acetabular seta ; in the *rettigi*-group and *fissurus*-subgroup (*fissurus*-group) there are apparently two acetabular setae, the upper of which may well be a displaced lateral seta of the clasper (Figs. 100, 105, 106) ; in *dilatatus*—in which the clasper processes are strongly modified—there are about half-a-dozen setae occupying the position of a single acetabular one (Fig. 97). Apart from the acetabular seta and a number of marginal and submarginal short setae, the fixed process has two (occasionally 1 or 3) long setae in the *agyrtes-*, *rettigi-* and *eximius*-groups ; in most other species there are 3–5 long setae. The lower (ventral) lobe of a sinuate fixed process bears a small apical seta (Figs. 66, 68—a.s.), except in *dolichus* (Fig. 96), *iranus* (Fig. 92), *dilatatus* (Fig. 97) and in certain Ethiopian species such as *calceatus-* and *eumeces*-groups (Figs. 116–119), *singularis* (Fig. 123) and *devignati* (Fig. 125).

30. *Shape and chaetotaxy of movable process of clasper*—basically the shape of this process appears to be elongate rectangular (as *e.g.* in Figs. 64–66) ; often, and usually partially, the process is widened or narrowed in varying degrees and the range of variations can be seen from Figs. 64–68, 70–103.

The chaetotaxy of the movable process is fundamentally the same in all species of a genus, but variations in number and position of the setae do of course occur quite frequently. In *Ctenophthalmus* the following groups of setae are found : (*a*) along the dorso-anterior angle of the process on the outer side are several (up to about 20) short setae which are often basiconiform, the so-called sensilla (Figs. 64–68, s.a.) ; when the angle is not very prominent (the anterior margin gradually merging into the dorsal one), the sensilla are often more numerous and extend along the greater part of the margin (*e.g.* Figs. 65, 67, 95, 96) ; if the movable process is triangular and has a narrow apex, the sensilla are either situated at the apex (as in the *agyrtes*-group (Figs. 70–79)) or along the anterior margin (*rettigi*-group (Figs. 105, 106)) ; (*b*) at or just below the dorso-posterior angle are two slender setae of which at least the dorsal one is often curved upwards (Figs. 64–68, x) ; in species with a strongly modified movable process these two setae help to determine where the true dorsal margin ends and the posterior margin begins (*e.g.* Figs. 66, 68, 81) ; (*c*) a short distance below the two x-setae is a short seta with a usually blunt tip (Figs. 64–68, y) ; (*d*) at varying distances below the y-seta is found the lowest group at the posterior margin, consisting usually of four slender setae—hence this group has been termed here " tetrad setae " (Figs. 64–68, t.s.). There are never any other setae at or near the margin below the tetrad setae. In certain species the lower x-seta is situated below the y-seta and it may then sometimes join up with the tetrad setae (see Figs. 90, 92, 109, 113–115, 118, 119, 128–130). There are two tetrads in *phyris* and sometimes in *eximius* which normally has three such setae, which number also occurs in the *spalacis*-group (Fig. 98), *dolomydis* (Fig. 82), *iranus* (Fig. 92), *moratus*-group (Fig. 111) and *cophurus* (Fig. 121). More than four tetrad setae (5–7) are found in the *calceatus*-group (Figs. 116, 117), *audax* (Fig. 109), *ominosus* (Fig. 112), *dilatatus* (Fig. 97) and *solutus* (Fig. 77) ; (*e*) relatively few small setae are scattered over the upper half of the inner and outer surface of the movable process.

31. *Fovea of movable process*—the fovea can be markedly elongate, ovoid or circular, according to species and is apparently absent only in *breviatus* (Fig. 65), *arvalis* (Fig. 89), *eximius* (Fig. 120), *triodontus* (Fig. 108) and *edwardsi* (Fig. 110).

32. *Surface structure of inner side of movable process*—the surface of the inner side of the movable process is smooth in all species except in members of the *atomus*-group in which the lower part of the surface is densely spiculose.

33. *Shape and chaetotaxy of sternum IX*—the distal arm of sternum IX can be very short, of medium length or about as long as the proximal arm. Usually one of these types is characteristic for a certain group but there are several exceptions. A most unusual feature is the bifid structure of the distal arm in *bifidatus* (Fig. 73) ; other diversions from the normal straight, simple distal arm are found in *capriciosus* (Fig. 75), *dux* (Fig. 95), *jeanneli*, *moratus* (Fig. 111), *acunus* and *ominosus* (Fig. 112). Some of the apical setae of the distal arm are spiniform in *acanthurus* (Fig. 115) and *capriciosus* (Fig. 75) only ; in all other species the setae of sternum IX are slender and usually rather short.

34. *Phallosome*—the phallosome in *Ctenophthalmus* is of a relatively simple structure. With a few exceptions the lateral walls of the aedeagus are symmetrical; the exceptions are found in the following Ethiopian species ; *singularis* (Fig. 186), *vanhoofi* (Fig. 187), *debrauwerei* (Fig. 188), *smithersi* (Fig. 189) and *devignati* (Fig. 190). Posteriorly and/or ventro-posteriorly the lateral walls may form hook-

shaped structures (*e.g.* Figs. 133–136, 140, 145, 146, 151, 152, 158, 171, 173, 175–178) or a small lobe (Figs. 179, 180) ; in a number of species the lower part of the posterior margin forms a narrow band-like sclerotization (see *e.g.* Figs. 131–136). Dorsally the lateral wall may be expanded in various degrees, *e.g.* in the *assimilis*-group (Figs. 146–154), *parcus*-group (Figs. 155, 156) ; in certain species there is a dorso-posterior extension due to excessive length of the dorso-apical sclerite (Figs. 134, 139, 141, 162, 166–169, 189, 190). In the *agyrtes*-group the lateral wall often forms ventrally a lamella which may be smooth, striated or covered with scale-like spicules and is either hanging down or folded up according to species or to subspecies (Figs. 131–134, 138–140). In a number of species the ventro-anterior part of the lateral wall has a rather strong sclerotization which encircles an apparent opening in the wall—this is referred to as the ventro-basal sclerotization (Figs. 69, v. b. s., 142–144, 146–154, 163). The tubus interior (Fig. 69, t.i.) is fairly long in *dux* (Fig. 158), *moratus* (Fig. 171) and *luberensis* (Fig. 185), but in all other species it is short and straight ; the tubus interior may bear dorsally a sclerotized outgrowth of various shapes according to species. Dorso-apically of the tubus interior lies the dorso-apical sclerite (Fig. 69, d.a.s.) which is shaped like an inverted Y ; its narrow dorsal portion is variable in length (see *e.g.* Figs. 130–138 and Figs. 141, 142, 147, 162) ; this sclerite is large in *orientalis* (Fig. 153), *dux* (Fig. 158), *spalacis*-group (Fig. 160), *rettigi*-group (Figs. 164, 165), *triodontus*-group (Figs. 166–168), *moratus*-group (Fig. 171) and *devignati* (Fig. 190). Below the dorso-apical sclerite are the two hamulae (Fig. 69, h.a.) which dorsally cover the sides of the tubus interior ; these hamulae are often ill developed and membranous, but in some species they are quite distinct (*e.g.* Figs. 131–133, 140, 145, 160–165, 179). The lunular sclerite (Fig. 69, l.s.) is a slender curved structure but in *dilatatus* (Fig. 159) it has a dorso-anterior bulbous expansion ; in some Ethiopian species this sclerite is rather long and often strongly curved (*e.g.* Figs. 173–175, 179). The dorsal lobe of the fulcrum (Fig. 69, d.l.f.) is fairly variable as can be seen from Figs. 131–190, but this is a species character rather than a group one. The aedeagal apodeme (Fig. 69, a.a.) is long and narrow in most species; exceptions are *e.g. pollex* (Fig. 152), *moratus*-group (Fig. 171), *nyikensis* (Fig. 177), *phyris* (Fig. 184), *singularis* (Fig. 186) and *smithersi* (Fig. 189).

FEMALE

35. *Shape of sternum VII*—the posterior margin of this sternum is always lobed and the following main types can be distinguished : (*a*) with a dorso-lateral lobe which may be rounded, triangular or obtuse (Figs. 193a, 194, 196, 197) ; (*b*) with a rounded or obtuse dorso-lateral lobe below which there is a smaller lobe (Figs. 191, 195, 199) ; (*c*) with a sinuate dorso-lateral lobe (Figs. 192, 200, 205, 206, 210) ; (*d*) with a dorso-lateral and a ventral lobe (Figs. 192, 198, 202).

36. *Shape of posterior margin of tergum VIII*—this margin is either broadly rounded and without a distinct sinus, although often with a small dorso-lateral lobe as in the Holarctic species and in some Ethiopian species (*eximius* (Fig. 206), *cophurus* and *luberensis*), or sinuate as in all other Ethiopian species.

37. *Unciform sclerotization of tergum VIII*—a single or double unciform sclerotization is present in most members of the *assimilis-*, *spalacis-* and *eximius*-groups (Figs. 196, 197), *singularis* and *blandulus ;* in all other species the sclerotization is absent or inapparent.

38. *Chaetotaxy of tergum VIII*—the following groups of setae can be distinguished: (*a*) anterior to the spiracular fossa there are one or a few small setae in about a third of the known species, but this occurrence is not a group character ; (*b*) on the latero-ventral part, above the preventral row, is a patch of setae (rarely reduced to one) of which the posterior ones are the longest ; (*c*) a preventral row of usually five or six setae. The length and position of the last two setae of this row constitute an important character ; they are submarginal in all Holarctic species (Figs. 191–200, 202–205) except for the *rettigi*-group (Fig. 201) while in the Ethiopian species they are marginal (Fig. 211) except for the *moratus-*, *eximius-*, *particularis-* and *triodontus*-groups and *cophurus* in which they are submarginal (in some Ethiopian species only the last seta is truly marginal). The last seta is placed above and close to the penultimate one in the *nivalis-*, *assimilis-* and *spalacis*-groups (Figs. 194–198) ; in all other species the last two setae are more or less in line with the others of the row. In the majority of species the last seta is shorter and stouter than the penultimate one ; in the *parcus-* and *rettigi*-groups and in *audax* (*triodontus*-group) there is little difference between those two setae (Figs. 207, 208) ; (*d*) in most species there are 3–5 genital setae (*e.g.* Figs. 191–196), but a larger number occurs in the *spalacis-*, *fissurus-*, *dux-*, *rettigi-* and *triodontus*-groups (Figs. 197, 201, 203, 205, 207).

39. *Sternum VIII*—the following four main types of sternum VIII can be distinguished : (*a*) with a broad and rounded apex as in *solutus* (Fig. 193a), *dux* (Fig. 203), *rettigi* (Fig. 201), *acuminatus*, *ruris*, *acanthurus*, *evidens*, *edwardsi* and *luberensis ;* (*b*) with a short and narrow sclerotized apex as in *agyrtes-* (except *solutus*), *assimilis-*, *pseudagyrtes-*, *dolichus-* and *dilatatus*-groups (Figs. 191, 192, 195, 196, 199, 200, 202) and in *golovi*, *dolomydis* (Fig. 198), *russulae* (Fig. 192), *caucasicus*, *triodontus*, *audax* (Fig. 207), *eximius* (Fig. 206) and *cophurus ;* (*c*) with a relatively long and narrow sclerotized apex as in *nivalis*, *nifetodes* and *orphilus* (Fig. 194) ; (*d*) the sternum is well sclerotized over the whole of its length and has a narrow apex as in the *spalacis-* and *fissurus*-groups (Fig. 197), *golovi*, *parcus* (Fig. 208), *dinormus* and in about half the number of Ethiopian species. The base of sternum VIII is rather strongly sclerotized in members of the *assimilis-*, *nivalis-*, *dilatatus-* and *parcus*-groups (Figs. 194–196, 198, 199, 208).

40. *Genital ducts*—the ductus bursae can be shorter, about as long as, or longer than the dorsal pronotal spines ; the length can vary within a group. In *vanhoofi* and *debrauwerei* (which might be grouped together) the bursa copulatrix is folded over the top part of the ductus bursae and the duplicatura vaginalis (in front of the ductus bursae) is much enlarged and often contains small dark sclerotizations (Fig. 212). The ductus obturatus is sometimes as long as the ductus spermathecae (Fig. 193) but both ducts are very often invisible in cleared specimens and *e.g.* in *vanhoofi* and *debrauwerei* only the ductus spermathecae could be seen

(Fig. 212). In *smithersi* the ductus spermathecae is relatively very broad for most of its length.

41. *Spermatheca*—in *Ctenophthalmus* there is relatively little variation in the shape of the spermatheca ; typical examples are shown in Figs. 191, 193–196, 201, 204. A small or fairly small spermatheca is found in the *spalacis- fissurus-* and *moratus*-groups (Figs. 197, 210) as well as in *dolomydis* (Fig. 198), *dinormus*, *parcus*, *acuminatus*, *eumeces*, *bacopus*, *engis* and *olbius*. A distinct transition of bulga into hilla is absent in *dux* only (Fig. 203). The bulga is somewhat constricted dorso-posteriorly in the following Ethiopian species: *phyris*, *vanhoofi*, *debrauwerei* (Fig. 212), *devignati*, *smithersi* and in occasional specimens of *ominosus* (Fig. 211), *calceatus*, *ansorgei* and *natalensis*.

CTENOPHTHALMUS Kolenati

Ctenophthalmus Kolenati, 1856, *Parasiten der Chiroptern*, Brünn ed.: 33 (type species (by subsequent designation) : *bisoctodentatus* Kolenati, 1863).

Typhlopsylla Taschenberg, 1880, *Die Flöhe* : 86 (*partim*).

Spalacopsylla Oudemans, 1906, *Tijdschr. Ent.* 49 : liii.

Ctenophthalmus subgenus *Neoctenophthalmus* Wagner, 1930, *Mag. Parasit., Leningr.* 1 : 154 (type species (by monotypy) : *dilatatus* Wagner, 1928). **Syn. nov.**

Euctenophthalmus Wagner, 1940, *Z. Parasitenk.* 11 : 595 (type species : *assimilis* Taschenberg, 1880). **Syn. nov.**

Spalacoctenophthalmus Wagner, 1940, *l. c.* : 595 (type species : *typhlus* Motsch., 1840 (=*spalacis* Jordan & Rothschild, 1911)). **Syn. nov.**

Palaeoctenophthalmus Wagner, 1940, *l. c.*: 596 (type species : *rettigi* Rothschild, 1908). **Syn. nov.**

Ctenophthalmus subgenus *Paractenophthalmus* Wagner, 1940, *l. c.*: 602 (type species (by subsequent designation): *dolichus** Rothschild, 1913 ; *see* Costa Lima and Hathaway, 1946, *Monogr. Inst. Osw. Cruz* **4** : 216). **Syn. nov.**

Head semifracticipit. Frontal tubercle small, triangular. Frontal row consisting of five setae, exceptionally four or six ; anterior to the lowest seta usually a small or minute seta present and this is sometimes situated in a notch in the frontal margin. Ocular row of three long setae, the upper of which is placed at margin of antennal fossa above eye. Postantennal region of head with three rows of setae, the first and/or second sometimes represented by only a single seta. Genal ctenidium horizontal or (less commonly) oblique, composed of three straight, (sub)parallel and backward/downward pointing spines ; in members of the *gratus*-subgroup a rudimentary fourth spine is quite often present between the eye and the posterior genal spine. Genal process rather narrow (often broader in the female than in the male) and with a rounded or obtuse apex, clearly visible behind the posterior genal spine. Eye fairly well developed (but never with a very distinct cornea), reduced or vestigial. Trabecula centralis absent, but a number of species, either in one sex or in both sexes, with an area communis, *i.e.* a fusion of the walls of the antennal fossae, visible as a fairly large oval pale area demarcated by a dark line. Setae of antennal pedicel extending only over base of clava in male, while in the female they may reach to about the apex of the clava. Labial palp five-segmented, the apex reaching to a point from the middle of the fore coxa to beyond the fore trochanter ; the apical segment bears anteriorly three minute subapical setae and posteriorly one minute and either one curved or two shorter straight setae.

*Wagner mentions *dolichus* and *dux* as belonging to this subgenus and although he states that he had not seen specimens of *dux* he knew the species from the description.

Pronotum normally with one row of setae, about half-a-dozen each side ; pronotal ctenidium straight (except in *particularis*), consisting of 12 (in *particularis* only), 14, 16 or 18 spines which on the whole are at least as long as the pronotum. Mesonotum with three (in certain species four) pseudosetae each side under the collar. Metanotal pleural arch and ridge well-developed.

Mid coxa with the oblique pale sulcus either complete or interrupted. Tibae without a comb-like arrangement of marginal setae. Posterior margin of hind tibia normally with seven notches, each containing not more than two short setae (apical notch excepted). Fifth tarsal segments with a basal plantar pair, three lateral pairs on fore and mid tarsus and three or four pairs on hind tarsus.

First four terga on each side with usually only one marginal spinelet (exceptionally one only on tergum V also). Both sexes with three antesensilial setae each side (except in females of *eximius* and *hoogstraali* which normally have four antesensilials each side), of which the middle one is the longest. Sensilium with 17 trichobothria each side and with one seta at the posterior margin.

Male : Apodeme of tergum IX well developed; clasper with two minute setae and one leucodisc situated below the sensilium ; manubrium usually fairly narrow and with an upturned tip ; one acetabular seta (absent in *dux*- and *dolichus*-groups) ; fixed process of clasper usually divided into two lobes, the lower of which may be sinuate. Movable process without spiniform setae ; with sensilla dorso-anteriorly or apically. Distal arm of sternum IX normally a straight simple structure ; one or two of the apical setae of this arm thickened in only a few species.

Aedeagus structurally relatively simple : tubus interior short and straight ; dorso-apical sclerite triangular and often elongate ; hamulus usually feebly sclerotized ; lateral wall of aedeagus sometimes lobed posteriorly or ventrally and the two sides asymmetrical in some species ; aedeagal apodeme narrow in most species (never exceptionally broad) ; aedeagal tendons not making more than half a convolution.

Female : Sternum VII with at least one lateral lobe. Tergum VIII with at most one seta at the posterior margin on the outer side. Sternum VIII varying in width, never very broad. Anal stylet with one long apical seta and two small subapical ones on the outer side. Ductus bursae not strongly sclerotized ; ductus obturatus fairly long. Spermatheca normally with a barrel-shaped bulga which is clearly demarcated from the narrow hilla (except in *dux*) ; hilla without papilla.

agyrtes-group

Head (Fig. 1). Area communis present in both sexes. Eye clearly indicated. First genal spine shorter and narrower than second ; ratio of spines 1 : 1·3 : 1·6. Labial palp reaching to ¾ length of fore coxa ; with a curved apical seta. Anterior occipital row of two setae, middle row of three, interspace between most dorsal seta and middle seta smaller than that between latter and most ventral one.

Thorax. Pronotum shorter than length of pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Arrangement of pseudosetae under mesonotal collar normal (Fig. 42). About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching about to apex of third segment (except in *apertus*-subgroup of *agyrtes*-group, in which it reaches about to middle of fourth segment). Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped (Figs. 32, 33). One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 46, 47, 62, 68, 70–79, 131–140). Sternum VIII (Figs. 46, 47) with a smooth, rounded or broadly truncate posterior margin (except in *capriciosus ;* see Fig. 62). Apodeme of tergum IX without an area fusoria (except in the *bisoctodentatus*-subgroup ; see Fig. 79). Corpus of clasper with a horizontal internal ventral incrassation. Fixed process of clasper divided by a triangular sinus into two lobes, the lower (ventral) of which may be subdivided by a sinus which is usually much broader than deep. Dorsal lobe of fixed process with two long marginal setae (except in *solutus* (Fig. 77) and *bisoctodentatus* (Fig. 79), which have 3–5 such setae). Ventral lobe of fixed process with a small dorso-apical seta. Movable process elongate, often triangular, gradually tapering towards the usually narrow apex along which about half-a-dozen sensilla are situated. Fovea elongate. Four tetrad setae (except in *solutus*, which has 7–9) situated usually well below apex of movable process. Distal arm of sternum IX very short in *bisoctodentatus*, of medium length in *hispanicus* (Fig. 71) and about as long as proximal arm in remaining species ; apex of distal arm with at least a few of its setae longish except in *bisoctodentatus* which has only short setae ; two of the setae subspiniform in *capriciosus*. Aedeagus (Figs. 131–140) without a dorsal expansion and without a ventro-basal sclerotization ; aedeagal apodeme narrow.

Female (Figs. 191, 193). Sternum VII with a well-developed dorsal lobe below which often a smaller lobe. No setae anterior to spiracular fossa of tergum VIII (except in *apertus*). Posterior margin of tergum VIII broadly rounded, dorsally with a smallish lobe. Tergum VIII anteriorly without unciform sclerotization. Apical short and stout seta of preventral row of tergum VIII well separated from penultimate seta, not placed above the latter. Sternum VIII with a short and fairly narrow apex (subapical portion broader in *solutus* (Fig. 193a)) ; base of sternum VIII not strongly sclerotized. Ductus bursae at most as long as dorsal spines of pronotal ctenidium. Spermatheca of normal shape and size ; hilla shorter than bulga.

Distribution. EUROPE and ASIA MINOR.

Hosts. Muridae, especially *Apodemus*, except for *bisoctodentatus* which is a parasite of *Talpa*.

The group can be divided into the following seven subgroups :

***agyrtes*-subgroup**

Male (Figs. 70, 71, 131, 132). Dorsal lobe of fixed process of clasper with two long and several shorter setae ; broad ventral lobe entire or in varying degrees subdivided by a sinus. Distal arm of sternum IX of medium length or about as long as proximal arm, varying from narrow to fairly broad. Phallosome : dorso-apical sclerite not very long; hamulus rectangular, fairly well differentiated ; lateral wall ventro-posteriorly with marginal sclerotization and ventrally with a distinct lobe which may be smooth, striated, scaled and turned up or down and does not extend to ventro-posterior part of lateral wall.

Female. Posterior margin of sternum VII with a fairly large rounded dorsal lobe below which usually a very small lobe.

agyrtes agyrtes (Heller, 1896), *Ent. Nachr.* 22 : 97, figs. 1, 2 (as *Typhlopsylla*). Frisian islands, north-east Netherlands, northern Germany, Denmark, Poland except south-east, western half of Czechoslovakia and north-east Austria.

agyrtes dinarus Rostigayev, 1959, *Zool. Zh.* 38 : 779, 781, fig. 4. Jugoslavia.

agyrtes eurous Jordan & Rothschild, 1912, *Novit. zool.* 19 : 59, fig. 1. Romania.

agyrtes fennicus Peus, 1950, *Syllegomena biol., Wittenberg* : 290, fig. 3b. Finland.

agyrtes graecus Jordan, 1926, *Novit. zool.* 33 : 392, fig. 19. Greece.

agyrtes impavidus Jordan, 1928, *Novit. zool.* 34 : 174, fig. 1. Northern and eastern France, northern Switzerland, Italy (Dolomites), Austria except the north-east.

agyrtes kleinschmidtianus Peus, 1950, *Syllegomena biol., Wittenberg* : 295, fig. 5. South-east Poland.

agyrtes ohridanus Wagner, 1939, *Bull. Soc. sci. Skoplje* 20 : 163, figs. 3–5. Jugoslavia.

agyrtes pelikani Rosický, 1959, *Acta Acad. Sci. czechoslov. brun.* 31 : 328, fig. 4. Central Bulgaria.

agyrtes peusianus Rosický, 1955, *Zool. ent. Listy* 4 : 366, 378, 381, figs. 1a, 2. Czechoslovakia (Low Tatra).

agyrtes prothelenus Peus, 1958, *Mitt. zool. Mus. Berl.* 34 : 156, figs. 16–19. Greece.

agyrtes provincialis Rothschild, 1910, *Ent. mon. Mag.* 46 : 207, fig. 3 (♀ on p. 255). South-east France, south-west Switzerland.

agyrtes ropotamensis Rosický, 1959, *Acta Acad. Sci. czechoslov. brun.* 31 : 329, figs. 5–9. South-east Bulgaria.

agyrtes rugosus Peus, 1959, *Mitt. zool. Mus. Berl.* 35 : 93, figs. 2, 3. Sicily.

agyrtes sardiniensis Ioff, 1927, *Ann. Mus. zool. Acad. St. Pétersb.* 28 : 428, fig. 12. Sardinia.

agyrtes serbicus Wagner, 1930, *Acta Soc. ent. Jugoslav.* 3–4 : 38, 42, fig. 3. Jugoslavia.

agyrtes smitianus Peus, 1950, *Syllegomena biol., Wittenberg* : 297, fig. 7E. Western and southern Netherlands, northern Belgium, southern Germany.

agyrtes taygetus Peus, 1958, *Mitt. zool. Mus. Berl.* 34 : 157, figs. 20–23. Greece.

agyrtes verbanus Jordan & Rothschild, 1920, *Ectoparasites* 1 : 102, figs. 88, 89. Switzerland, northern Italy.

agyrtes wagnerianus Peus, 1950, *Syllegomena biol., Wittenberg* : 290, fig. 3C. Jugoslavia (north-western Slovenia).

hispanicus Jordan, 1938, *Novit. zool.* 41 : 108, fig. 50. Spain.

nobilis nobilis (Rothschild, 1898), *Novit. zool.* 5 : 539 (as *Typhlopsylla*). South-east England, central and south-eastern France.

nobilis dobyi Beaucournu, 1962, *Bull. Soc. zool. Fr.* 87 : 235, figs. 1–3. Pyrénées Orientales, France.

nobilis vulgaris Smit, 1955, *Trans. R. ent. Soc. Lond.* 107 : 349, figs. 32–70. British Isles (except south-east England), western France.

***andorrensis*-subgroup**

Male (Figs. 72, 73, 133, 134). Dorsal lobe of fixed process with two long and several shorter setae ; broad ventral lobe not deeply sinuate. Tetrad setae of movable process situated rather high up in *bifidatus* (Fig. 73). Distal arm of sternum IX about as long as proximal arm, narrow (in *bifidatus* (Fig. 73) with, on each side, a ventro-basal extension bearing two long setae—a structure unique in the genus). Phallosome : dorso-apical sclerite as in members of *agyrtes*-subgroup ; hamulus broad and crescentic in *andorrensis* (Fig. 133), not well sclerotized in *bifidatus* (Fig. 134) ; lateral wall ventro-posteriorly drawn out into a sharp projection, with only a very narrow strip of marginal sclerotization, and ventrally with a large triangular lobe which is either striated or scaled and reaches ventro-posterior part of lateral wall.

Female (Fig. 191). Sternum VII as in *agyrtes*-subgroup. Tergum VIII with usually only two genital setae (usually 3 or 4 in other subgroups).

andorrensis Smit, 1960, *Proc. R. ent. Soc. Lond.* (B) 29 : 14, figs. 1–3. Andorra.

bifidatus Smit, 1960, *Tijdschr. Ent.* 103 : 277, figs. 1–3. Turkey.

***arvernus*-subgroup**

Male (Figs. 47, 62, 74, 75, 135, 136). Posterior margin of sternum VIII strongly convex in *arvernus* (Fig. 47), more straight in *baeticus* and with a long slender projecting dorso-posterior lobe in *capriciosus* (Fig. 62) which is unique in the genus. Dorsal lobe of fixed process of clasper with one or two long and several shorter setae ; ventral lobe very narrow ; acetabular seta very variable in length. Apex of movable process very narrow, with five minute sensilla. Distal arm of sternum IX about as long as proximal arm, with relatively few setae which are all placed at or near the apex, in *capriciosus* (Fig. 75) with two dorsal pre-apical subspiniform setae each side. Phallosome : dorso-apical sclerite short ; hamulus rectangular ; lateral wall ventro-posteriorly with a fairly broad marginal sclerotization (as in *agyrtes*-subgroup) with its tip extending well beyond the lateral wall, which forms ventrally at most a medium-sized smooth lobe.

Female. Sternum VII and segment VIII virtually as in the *agyrtes*-subgroup (*cf.* Fig. 191).

arvernus Jordan, 1931, *Novit. zool.* 36 : 225, fig. 1. Southern France, northern Spain.

baeticus Rothschild, 1910, *Ent. mon. Mag.* 46 : 208, figs. 1, 2. Portugal.

capriciosus Smit, 1960, *Tijdschr. Ent.* 103 : 279, figs. 4–7. Jugoslavia.

proximus-subgroup

Male (Figs. 76, 137). Dorsal lobe of fixed process with two long and several shorter setae ; ventral lobe rather broad, undivided. Distal arm of sternum IX a little shorter than proximal arm, broad, with obtuse apex ; proximal arm markedly straight. Phallosome : dorso-apical sclerite longish, triangular ; hamulus poorly sclerotized ; posterior margin of lateral wall without strong sclerotization, ventro-posteriorly with a short downward-pointing lobe ; ventrally the lateral wall does not form a lobe.

Female. Sternum VII with a large rounded lateral lobe. Segment VIII as in the *agyrtes*-subgroup. Ductus bursae about as long as dorsal pronotal spines.

proximus (Wagner, 1903), *Horae Soc. ent. ross.* 36 : 147, Pl. 2, fig. 5 (as *Typhlopsylla*). Caucasus, Turkey.

solutus-subgroup

Male (Figs. 77, 138). Short dorsal lobe of fixed process of clasper with three long and several shorter setae ; ventral lobe trapezoidal, very broad apically. Movable process with 7–9 tetrad setae. Distal arm of sternum IX triangular, about as long as proximal arm. Phallosome : dorso-apical sclerite very short ; hamulus narrow, elongate ; apical margin of lateral wall straight, slightly thickened in ventral half ; lateral wall ventrally forming a very short lobe beneath which is a characteristic longitudinal sclerotization.

Female (Fig. 193). Posterior margin of sternum VII forming a very straight-edged broad lobe below which there may be a small sinus. Apex of sternum VIII broader than in the other subgroups.

solutus solutus Jordan & Rothschild, 1920, *Ectoparasites* 1 : 105, figs. 94, 95. Switzerland, north Italy, Austria, Czechoslovakia, eastern Germany, Poland, southern Ukraine.

solutus siculus Peus, 1959, *Mitt. zool. Mus. Berl.* 35 : 97, figs. 4, 6. Sicily.

apertus-subgroup

Male (Figs. 78, 139). Dorsal lobe of fixed process with two long and two or three shorter apical setae ; ventral lobe long and narrow or broad and subdivided by a wide sinus. Movable process with a comparatively small acetabular part, anterior margin sloping back from about middle, the lower part consequently L-shaped. Distal arm of sternum IX not quite as long as proximal arm, narrow, its apical half of uniform width, the apical margin oblique with ventral angle more pronounced than dorsal one and a characteristic notch just below the former. Phallosome : inner tube directed upwards at an angle of 45° in relation to long axis of median lamella, dorso-apical sclerite rather long, aedeagus markedly drawn out dorso-posteriorly and with concave dorsal margin ; hamulus large but feebly sclerotized ; posterior margin of lateral wall not strongly sclerotized, with a large striate ventral lobe which may be turned up or down and has part of its margin minutely serrate.

Female. One or a few setae anterior to spiracular fossa of tergum VIII. Sternum VII with a large dorsal lobe below which there may be a short lobe, while the ventro-posterior angle is also drawn out into a lobe. Sternum VIII as in the *agyrtes*-subgroup.

apertus apertus Jordan & Rothschild, 1921, *Ectoparasites* 1 : 133, figs. 107, 108. South-eastern France.

apertus allani Smit, 1955, *Ent. mon. Mag.* 91 : 145, figs. 1–3. Northern Spain and central France.

apertus gilcolladoi Wagner, 1939, *Z. Parasitenk.* 11 : 235, figs. 1, 3, 6. Central Spain.

bisoctodentatus-subgroup

Spiracular fossae of terga II–VII larger than in members of the foregoing subgroups (Fig. 33, —*cf.* Fig. 32).

Male (Figs. 79, 140). Apodeme of tergum IX small, with an area fusoria. Dorsal lobe of fixed process of clasper with two to three long and a number of shorter setae, latter also present on outer lateral surface of this lobe ; ventral lobe very broad, trapezoidal. Manubrium strongly turned upwards. Movable process with broad rounded apex. Distal arm of sternum IX very short, none of its setae very long. Phallosome : small in relation to clasper, differing considerably from that of members of the other subgroups by a subdorsal deep sinus in posterior margin of lateral wall ; hamulus rectangular, well developed ; ventral margin of lateral wall with a small upturned triangular lobe (difficult to see even in extremely good preparations) ; tip of median lamella pointing strongly upwards.

Female. Sternum VII either with only a broad upper lobe or with a sinus dividing off a narrower upper and similar or broader lower lobe.

bisoctodentatus bisoctodentatus Kolenati, 1863, *Horae Soc. ent. ross.* 2 : 35, Pl. 2 fig. 6. Southern Sweden, north and east Germany, Poland, European U.S.S.R., Finland, Czechoslovakia, Romania, Jugoslavia, Austria, Switzerland, France, Jersey.

bisoctodentatus heselhausi (Oudemans, 1914), *Ent. Ber. Amst.* 4 : 139 (as *Spalacopsylla*). Great Britain, Belgium, west and south Germany, north-east Austria, northern Switzerland.

nivalis-group

Head (Figs. 2, 5, 6). Area communis present in both sexes in the *russulae*-subgroup, absent in male and present (though rather small) in female in *golovi*-, *nivalis*- and *dolomydis*-subgroups. Eye moderately well developed, except in *dolomydis* (Fig. 2) in which it is vestigial. First genal spine shorter and narrower than second ; ratio of spines 1 : 1·2 : 1·5, except in *russulae*-subgroup in which it is 1 : 1·5 : 2. Labial palp reaching to ¾ length of fore coxa in *russulae*-subgroup, to apex (or slightly beyond) in the other three groups ; with a curved apical seta. Anterior occipital row of two setae, middle row of three, interspace between upper and middle setae smaller than that between middle and lower ones.

Thorax. Pronotum shorter than length of pronotal spines, considerably so in *russulae*. Pronotal ctenidium with 16 spines in both sexes in *russulae*-subgroup and in *dolomydis*-subgroup ;

with 18 spines in male and 16 in female in *golovi*-subgroup and *nivalis*-subgroup. Arrangement of setae under mesonotal collar normal. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete in *russulae*- and *golovi*-subgroups, dorsally interrupted in *nivalis*- and *dolomydis*-subgroups. Longest apical seta of second hind tarsal segment reaching apex of third segment in *russulae*-subgroup, tip of third or middle of fourth segment in *nivalis*- and *dolomydis*-subgroups, and from middle to apex of fourth segment in *golovi*-subgroup. Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped. One seta (lowest of tergal main rows) below level of tergal spiracular fossae. Basal sternum with some lateral setae in *golovi*-subgroup and *dolomydis*-subgroup, without such setae in *russulae*-subgroup and *nivalis*-subgroup.

Male (Figs. 48–50, 54, 66, 80–84, 141–145). Posterior margin of sternum VIII smooth in *russulae*-, *nivalis*- and *dolomydis*-subgroups (Figs. 48–50), finely serrate in *golovi*-subgroup (Fig. 54) ; ventral margin of this sternum apically emarginate in varying degrees (emargination barely visible in Argyropulo's figure of *kirschenblatti* (Argyropulo, 1936, *Konowia* 15 : 146) but he states " Das 8. Sternit ist von der ventralen Seite schwach ausgeschnitten."). Apodeme of tergum IX with an area fusoria. Corpus of clasper with a triangular internal ventral incrassation except in the *russulae*-subgroup (Fig. 83). Fixed process of clasper divided by a sinus into a dorsal lobe, which may be fairly large, and a narrow, usually non-sinuate and apically obtuse ventral lobe. Dorsal lobe of fixed process with two to four large setae and a number of shorter ones ; ventral lobe with a small apical seta inserted at middle of apical margin in members of *nivalis*-subgroup (Figs. 66, 80, 81) and more dorso-apically in other members of the group. Movable process usually broad and basically of rectangular shape which may not be immediately apparent in forms in which the apical and/or ventral portions of the margin are strongly slanting. Three to eight sensilla situated along dorso-anterior angle of movable process. Fovea ovoid, medium sized to very small. Four tetrad setae, usually situated well below dorso-posterior angle of movable process ; in *nifetodes* sspp. there are 4–6 tetrads (Figs. 66, 81). Distal arm of sternum IX of medium length, quite narrow in *russulae*-, *nivalis*- and *dolomydis*-subgroups (Figs. 80–83), broader in *golovi*-subgroup (Fig. 84) ; none of the setae at apex of distal arm very long. Aedeagus with a more or less straight dorsal margin in *golovi*- and *dolomydis*-subgroups (Figs. 144, 145), with a convexity in middle of dorsal margin in *nivalis*-subgroup (Figs. 142, 143) and with dorso-apical expansion in *russulae*-subgroup (Fig. 141) ; with a well-developed ventro-basal sclerotization in *nivalis*- and *dolomydis*-subgroups (Figs. 142–144) only. Aedeagal apodeme narrow.

Female (Figs. 192, 194, 198). Sternum VII with a large triangular dorso-lateral lobe and with a small ventral lobe in *dolomydis*-subgroup (Fig. 198), with or without this ventral lobe in *nivalis*-subgroup (Fig. 194) ; in *golovi*-subgroup an additional median lobe ; in *russulae*-subgroup (Fig. 192) margin of sternum VII as in *dolomydis*-subgroup (Fig. 198) except dorso-lateral lobe squarer and subventral sinus narrower. Tergum VIII with a few setae anterior to spiracular fossa in *nivalis*-, *dolomydis*- and *golovi*-subgroups (Figs. 194, 198), without such setae in *russulae*-subgroup (Fig. 192). Posterior margin of tergum VIII broadly rounded, without sinus. Tergum VIII anteriorly without unciform sclerotization. Short and stout apical seta of preventral row of tergum VIII well-separated from penultimate seta and not placed above it in *russulae*- and *golovi*-subgroups (Fig. 192) while in *nivalis*- and *dolomydis*-subgroups (Figs. 194, 198) these two setae are close together and the apical stout seta is placed above penultimate one. Sternum VIII with narrow apex ; base of sternum VIII strongly sclerotized except in *golovi*-subgroup. Ductus bursae about as long as dorsal spines of pronotal ctenidium. Hilla of spermatheca about as long as bulga in *dolomydis*, shorter in all other members of the *nivalis*-group.

Distribution. Mountainous regions of SOUTHERN EUROPE, NORTH AFRICA, and CAUCASUS area.

Hosts. *Crocidura* (*russulae*-subgroup), *Citellus* and other rodents (*golovi*-subgroup) and Microtinae (*nivalis*- and *dolomydis*-subgroups).

Remarks. This group occupies an intermediate position between the *agyrtes*- and the *assimilis*-groups. Though admittedly a somewhat heterogeneous taxon, the group contains species more closely related to one another than to members of the other two groups. The species which belong to the *nivalis*-group can be divided into the following four subgroups.

nivalis-subgroup

Area communis absent in male, present in female. Labial palp reaching at least to apex of fore coxa. Pronotal ctenidium with 18 spines in male, 16 in female. Basal sternum without lateral setae.

Male (Figs. 50, 80, 81, 142, 143). Ventral margin of sternum VIII apically deeply emarginate. Dorsal lobe of fixed process of clasper with three or four long setae and a number of shorter but strong setae. Distal arm of sternum IX with oblique apical margin. Phallosome : dorsal wall with a convex expansion developed in various degrees ; dorso-apical sclerite narrow, very long, attached to a small semicircular sclerotization at dorso-posterior angle of lateral wall ; hamulus narrow, membranous ; the lateral wall forms ventro-apically two small lobes which partially overlap ; posteriorly the lateral wall is at most feebly thickened ; with a well-developed ventro-basal sclerotization.

Female (Fig. 194). Posterior margin of sternum VII with a triangular dorso-lateral lobe. One or a few small setae anterior to spiracular fossa of tergum VIII.

Distribution. Mountainous areas in SWITZERLAND, adjacent portions of SOUTHERN FRANCE, GERMANY, AUSTRIA and ITALY, JUGOSLAVIA, PYRÉNÉES (one ♀ *orphilus* ssp. in Tring collection).

Hosts. Microtinae.

nivalis nivalis Rothschild, 1909, *Novit. zool.* 16 : 68, pl. 11, figs. 13, 14. South-east France (Hautes-Alpes and Haute-Savoie).

nivalis cervinus Jordan & Rothschild, 1920, *Ectoparasites* 1 : 100, figs. 85, 87. Switzerland.

nivalis helvetius Smit, 1963, *Mitt. Schweiz. ent. Ges.* 36 : 100, figs 3, 4, 7. Switzerland.

nifetodes nifetodes Wagner, 1933, *Konowia* 11 : 279, fig. 5. Jugoslavia (Montenegro, Bosna).

nifetodes brelihi Rosický & Carnelutti, 1959, *Čsl. Parasitol.* 6 : 140, 147, figs. 8–11. Jugoslavia (Slovenia).

nifetodes eugeniae Wagner, 1938, *Konowia* 16 : 253, fig. 2. Jugoslavia (Hercegovina).

nifetodes martinorum Smit, 1957, *Ann. Mag. nat. Hist.* (12) 10 : 314, figs. 16, 17, 19, 22. Jugoslavia (Makedonija).

orphilus orphilus Jordan & Rothschild, 1923, *Ectoparasites* 1 : 288, fig. 281. Switzerland, adjacent parts of southern France, Germany and Austria, not further east than about 11° 15′ E.

orphilus dolomiticus Jordan, 1928, *Novit. zool.* 34 : 175, fig. 3. Italy (Dolomites), parts of Austria and southern Germany not further west than about 11° 15′ E.

dolomydis-subgroup

Area communis absent in male, present in female. Eye vestigial. Labial palp reaching apex of fore coxa or slightly beyond. Pronotal ctenidium with 16 spines in both sexes. Basal sternum with some lateral setae.

Male (Figs. 49, 82, 144). Ventral margin of sternum VIII apically emarginate. Dorsal lobe of fixed process of clasper with three long and several shorter slender setae. Distal arm of sternum IX rather short, its apical margin oblique. Phallosome : dorsal wall of aedeagus straight, without an expansion ; dorso-apical sclerite of medium length ; hamulus not sclerotized and inapparent ; ventro-apically the lateral wall forms one small lobe ; posteriorly the lateral wall bears no sclerotizations ; with a well-developed ventro-basal sclerotization.

Female (Fig. 198). Sternum VII with a large triangular lobe and a smaller ventral one. A few small setae anterior to spiracular fossa of tergum VIII.

Distribution. CENTRAL JUGOSLAVIA.

Host. *Dolomys.*

dolomydis Smit, 1957, *Ann. Mag. nat. Hist.* (12) 10 : 317, figs. 20, 21, 23–26. Jugoslavia (Bosna).

russulae-subgroup

Area communis present in both sexes. First spine of genal ctenidium rather short. Labial palp reaching to about ¾ lenth of fore coxa. Pronotal ctenidium with 16 spines in both sexes. Basal sternum without lateral setae.

Male (Figs. 48, 83, 141). Ventral margin of sternum VIII apically deeply emarginate. Dorsal lobe of fixed process with two long and a few shorter setae. Distal arm of sternum IX slender basally but broadening to oblique apical margin ; proximal arm straight and narrow. Phallosome : dorso-apical sclerite much thickened and very long, hence dorsal wall of aedeagus forming a large triangular apical expansion ; hamulus rectangular, not strongly sclerotized ; ventro-apically the lateral wall forms a very small sharp lobe ; lateral wall posteriorly not sclerotized ; ventro-basal sclerotization virtually absent ; aedeagal apodeme relatively wider than in other members of the subgenus.

Female (Fig. 192). Sternum VII as in *dolomydis*-group except dorso-lateral lobe squarer and subventral sinus narrower. No setae in front of spiracular fossa of tergum VIII.

Distribution. NORTH AFRICA, SARDINIA.

Host. *Crocidura.*

russulae Jordan & Rothschild, 1912, *Novit. zool.* 19 : 365, pl. 10, figs. 12, 13. Algeria, Sardinia.

golovi-subgroup

Area communis absent in male, present in female. Labial palp reaching apex of fore coxa. Pronotal ctenidium with 18 spines in male, 16 in female. Basal sternum with some lateral setae.

Male (Figs. 54, 84, 145). Ventral margin of sternum VIII apically emarginate in varying degrees, emargination almost absent in *kirschenblatti*. Dorsal lobe of fixed process of clasper with three long setae and several shorter ones. Distal arm of sternum IX fairly broad. Phallosome : dorsal wall of aedeagus straight, without an expansion ; dorso-apical sclerite of medium length, narrow ; hamulus quadrangular, well sclerotized, especially posteriorly ; lateral wall ventro-apically drawn out into a sharp hook-like extension and posteriorly not sclerotized ; without a ventro-basal sclerotization.

Female. Sternum VII with two or three lobes. A few small setae anterior to spiracular fossa of tergum VIII.

Distribution. CAUCASUS.

Hosts. *Citellus* and other rodents.

golovi golovi Ioff & Tiflov, 1930, *Mag. Parasit., Leningr.* 1 : 215, 227. figs. 11, 12. Northern regions of Caucasus.

golovi alpestris Argyropulo, 1935, *Z. Aserbeid. Inst. Microbiol.* 5 : 188, fig. 67(2). Azerbaidzhan.

bifurcus Ioff, 1940, *Mag. Parasit., Leningr.* 7 : 219, 227, fig. 11. Middle Caucasus.

chionomydis Ioff & Rostigayev, 1950, *Med. Parazitol., Moskva* 19 : 271. Western Caucasus.

kirschenblatti Argyropulo, 1936, *Konowia* 15 : 145, figs. 1, 2. Gruziya.

assimilis-group

Head (Figs. 7–10). Area communis absent in male, present in female. Eye moderately well developed except in *gratus* in which it is vestigial. First genal spine not very markedly shorter or narrower than second ; ratio of spines 1 : 1·2 : 1·4 or 1·5, except in *gratus*-subgroup in which it is 1 : 1·2 : 1·7. Labial palp reaching to two-thirds or ¾ length of fore coxa ; with a curved pre-apical seta. Anterior occipital row of two setae, middle row of three and interspace between middle seta and upper one smaller than between former and lower one. Interspace between lowest and penultimate setae of the posterior occipital row not much larger than those between other setae of row.

Thorax. Pronotum shorter than or subequal to pronotal spines. Pronotal ctenidium with 18 spines in male and 16 in female in *assimilis-*, *parvus-*, *orientalis-* and *pisticus*-subgroups, in *gratus-* and *breviatus*-subgroups the number in female is 16 but in male it varies from 16–18, the former number being commoner in all species. Normal arrangement of pseudosetae under mesonotal collar, except in *gratus* sspp. which often have only one or two dorsal pseudosetae each side. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa either complete or dorsally interrupted in varying degrees. Longest apical seta of second hind tarsal segment reaching to tip of third segment or to about middle of fourth. Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, except in *gratus* (Fig. 35) in which they are more or less circular ; spiracular fossa of tergum VIII of female broad (much reduced in *gratus*, *congener tenuistigmatus* and Y-shaped in *pisticus*). One seta (the lowest of the tergal main rows) below level of tergal spiracular fossae. Basal sternum with a few lateral setae in only the female of a few species ; cuticular ridges of this sternum not forming a finger-print pattern.

Male (Figs. 51, 56, 57, 64, 65, 69, 85–94, 146–154). Sternum VIII with a broadly rounded posterior margin which is at least partially finely serrate. Apodeme of tergum IX with an area fusoria. Corpus of clasper with a triangular internal ventral sclerotization. Fixed process of clasper with a usually large dorsal lobe and a short ventral lobe which is always rather narrow, while it is not differentiated in *arvalis* and *orientalis*. Dorsal lobe of fixed process with 3–5 large marginal or submarginal setae ; ventral lobe with a small dorso-apical seta, except in *iranus* (*orientalis*-subgroup). Movable process of a basically elongate rectangular shape, often narrowed in lower half ; with 5–10 sensilla along dorso-anterior angle. Fovea ovoid or circular. Four tetrad setae (except in *iranus* which has 3), situated well below dorso-posterior angle which is usually markedly sclerotized. Distal arm of sternum IX rather broad and obtuse and of medium length (except in *pollex* in which it is subequal to proximal arm). Phallosome : aedeagus with a dorsal expansion which may be broad, long and narrow, or very little developed ; with a ventro-basal sclerotization ; posterior margin not strongly sclerotized ; aedeagal apodeme narrow (except in *pollex*).

Female (Figs. 195, 196). Sternum VII usually with a squarish dorsal lobe, below which often a smaller rounded lobe. No setae anterior to spiracular fossa of tergum VIII (except in *breviatus*-subgroup, *iranus*, *pisticus* and *wagneri*). Posterior margin of tergum VIII broadly rounded, dorsally often with a small lobe. Tergum VIII anteriorly with a single or double unciform sclerotization in *assimilis*- and *orientalis*-subgroups. Apical short and stout seta of preventral row of tergum VIII situated very close to and above penultimate seta. Sternum VIII with a narrow apex ; base of sternum VIII strongly sclerotized in several species. Ductus bursae at most as long as dorsal pronotal spines in *assimilis*- and *pisticus*-subgroups, longer in the other groups. Spermatheca of normal shape and size ; hilla shorter than bulga.

Distribution. PALAEARCTIC REGION.

Hosts. Predominantly on Microtinae ; *orientalis*-, *pisticus*-subgroup and a few members of the *breviatus*-subgroup on Sciuridae, while *gratus* has become a *Spalax* parasite.

This group can be divided into six subgroups.

assimilis-subgroup

Labial palp reaching to two-thirds length of fore coxa. Basal sternum of female normally without lateral setae.

Male (Figs. 69, 85, 86, 146). No setae anterior to spiracular fossa of tergum VIII. Dorsal lobe of fixed process of clasper large but not much differentiated, with three or four long setae and several shorter ones ; ventral lobe short and obtuse. Distal arm of sternum IX short and broad, not or hardly tapering caudad, with a straight apical margin. Phallosome : aedeagus with a broad basal and large dorsal expansion ; dorso-apical sclerite long and slender ; hamulus not strongly sclerotized, narrow and curved forward ; lateral wall ventrally with a tooth-like projection.

Female (Fig. 195). Posterior margin of sternum VII with a large, often blunt, dorsal lobe below which usually a smaller rounded lobe. Tergum VIII anteriorly with a single or double unciform sclerotization. Ductus bursae shorter than dorsal pronotal spines.

Hosts. Microtine rodents.

assimilis (Taschenberg, 1880), *Die Flöhe :* 95, pl. 4 figs. 27a, b (as *Typhlopsylla*).

bogatschevi Wagner & Argyropulo, 1934, *Z. Parasitenk.* 7 : 288, figs. 8–10. Azerbaidzhan.

congener congener Rothschild, 1907, *Novit. zool.* 14 : 331, fig. 5.

congener allousei Hubbard, 1956, *Iraq nat. Hist. Mus. Publ.* (11) : 3, fig. 2 (lower part). Iraq.

congener asiaticus Argyropulo, 1935, *Z. Aserbeid. Inst. Microbiol.* 5 : 194, fig. 74(2). Transcaucasia.

congener bureschi Rosický, 1959, *Acta Acad. Sci. czechoslov. brun.* 31 : 331, figs. 10, 12a. South-west Bulgaria.

congener geminus Peus, 1959, *Mitt. zool. Mus. Berl.* 35: 98, figs. 7, 8. Sicily.

congener italoscopus Peus, 1958, *Mitt. zool. Mus. Berl.* 34 : 163, figs. 26 A–C. Greece.

congener levadianus Peus, 1958, *Mitt. zool. Mus. Berl.* 34 : 162, figs. 25 A, B. Greece.

congener secundus Wagner, 1916, *Trud. Mus. Tavr. Gub. Zemstva* (1914) : 5, fig. 4. Crimea.

congener tenuistigmatus Smit, 1960, *Bull. Brit. Mus. (nat. Hist.), Ent.* 8 : 341, figs. 8, 9. Israel.

congener troilus Peus, 1954, *Bonn. zool. Beitr.*, Sonderb. 1954 : 126, figs. 11, 12. Greece.

congener vicarius Jordan & Rothschild, 1921, *Ectoparasites* 1 : 135, figs. 110, 111. Romania.

congeneroides congeneroides Wagner, 1930, *Annu. Mus. zool. Acad. St. Pétersb.* 30 : 537. Russian Far East, Korea, Japan.

congeneroides truncus Ioff & Scalon, 1950, *Med. Parazitol., Moskva* 19 : 272. Sakhalin, Japan.

crudelis Jordan, 1932, *Novit. zool.* 38 : 269, fig. 25. Yunnan.

intermedius Argyropulo, 1935, *Z. Azerbeid. Inst. Microbiol.* 5 : 194, figs. 73(3), 75B. Azerbaidzhan.

obtusus Jordan & Rothschild, 1912, *Novit. zool.* 19 : 60, figs. 3, 4. Norway, Central Europe.

savii Jordan & Rothschild, 1921, *Ectoparasites* 1 : 137, fig. 112. Italy.

tatianae Argyropulo, 1936, *Konowia* 15 : 148, figs. 3, 4. Transcaucasia.

uncinatus (Wagner, 1898), *Horae Soc. ent. ross.* 31 : 590, pl. 9 fig. 24, pl. 10 fig. 29 (as *Typhlopsylla*).

gratus-subgroup

Eye vestigial. Labial palp reaching to ¾ length of fore coxa. First two genal spines separated by a small interspace ; a fourth small or fairly large genal spine, situated above the third spine, present in *gratus gratus* (Figs. 9, 10) and *gratus elaeus*. Pronotum in some specimens with two rows of setae. One or two pseudosetae under mesonotal collar, the ventral one often absent. Tergal spiracular fossae oval or almost circular (Fig. 35), not conical as in members of the other subgroups of the *assimilis*-group.

Male (Figs. 87, 147). Modified abdominal segments and phallosome of same type as in members of *assimilis*-subgroup.

Female. Tergum VIII anteriorly with or without an unciform sclerotization. Ductus bursae subequal to dorsal pronotal spines.

Hosts. *Spalax* spp.

gratus gratus Jordan & Rothschild, 1920, *Ectoparasites* 1 : 123, figs. 102, 103. Greece.

gratus elaeus Peus, 1958, *Mitt. zool. Mus. Berl.* 34 : 160, figs. 24A–C. Greece.

gratus menoetius Peus, 1954, *Bonn. zool. Beitr.*, Sonderb. 1954: 125, figs. 9D, E, 10B. Greece.

parvus-subgroup

Labial palp reaching to two-thirds length of fore coxa. Basal abdominal sternum of female with a few lateral setae.

Male (Figs. 88, 148). Modified abdominal segments similar to those of members of the *assimilis*-group. Phallosome : dorsal expansion of aedeagus apparently quite large (it is distorted in the only male available for study) ; dorso-apical sclerite very short ; hamulus membranous ; lateral wall ventrally without a sharp hook-like projection.

Female. Tergum VIII anteriorly without an unciform sclerotization. Ductus bursae shorter than dorsal pronotal spines. In other respects similar to females of the *assimilis*-subgroup.

Hosts. Microtine rodents (*parvus* has also been found on *Apodemus* and, presumably accidentally, on *Talpa*).

parvus Argyropulo, 1935, *Z. Aserbeid. Inst. Microbiol.* 5 : 194, figs. 72, 73(4). Caucasus.

shovi Rostigayev, 1948, *Med. Parazitol., Moskva* 17 : 252, figs. 1–3. Gruziya.

breviatus-subgroup

Labial palp reaching to ¾ length of fore coxa. Pronotal ctenidium with 16 spines in female and 18 in male in *breviatus*—in other species of this subgroup (of which I have seen insufficient material) 16 appears to be the usual number for male as well.

Male (Figs. 64, 65, 89, 90, 151, 152). Tergum VIII with one or a few short setae in front of the spiracular fossa. Dorsal lobe of fixed process of clasper not very large ; ventral lobe developed in varying degrees, virtually absent in *arvalis*, fairly long in *pollex*. Movable process not markedly narrower in lower half. Distal arm of st. IX widening caudad. Phallosome : aedeagus with a long, narrow, upright expansion ; dorso-apical sclerite short and broad ; hamulus elongate and of rather irregular shape, not strongly sclerotized ; ventro-posterior angle of lateral wall of aedeagus drawn out into a narrow projection ; median lamella of aedeagal apodeme narrow, except in *pollex*, in which it is very broad.

Female. Tergum VIII anteriorly without an unciform sclerotization. Ductus bursae longer than dorsal pronotal spines.

Hosts. Microtinae, but *pollex* and *breviatus* mainly on *Citellus.*

arvalis Wagner & Ioff, 1926, *Rev. Microbiol., Saratov* 5 : 76, fig. N. S.E. European U.S.S.R.

breviatus Wagner & Ioff, 1926, *Rev. Microbiol., Saratov* 5 : 75, pl. 2 fig. 4. S.E. European U.S.S.R.

kazbek Tiflov, 1953, *Med. Parazitol., Moskva* 22 : 464. Caucasus.

pollex Wagner & Ioff, 1926, *Rev. Microbiol., Saratov* 5 : 75, fig. L, pl. 2 fig. 3. S.E. European U.S.S.R.

teres Ioff & Argyropulo, 1934, *Z. Parasitenk.* 7 : 160, figs. 16, 17. Armenia.

wladimiri Isayeva-Gurvich, 1948, *Izv. Akad. Nauk. Azerb. S.S.R.* 5 : 89. Azerbaidzhan.

orientalis-subgroup

Labial palp reaching to two-thirds or ¾ length of fore coxa.

Male (Figs. 56, 91–93, 149, 150, 153). No setae anterior to spiracular fossa of tergum VIII. Dorsal lobe of fixed process of clasper large or fairly large ; ventral lobe developed in varying degrees, virtually absent in *orientalis*, very long in *wagneri*. Movable process variable ; three tetrad setae in *iranus*, four in the other species. Distal arm of sternum IX short. Phallosome : aedeagus with a low dorsal expansion in *wagneri* and *orientalis*, a larger one in *iranus ;* dorso-apical sclerite very large in *orientalis*, of normal size in other species ; hamulus rather large but hardly sclerotized and therefore indistinct ; ventral area of lateral aedeagal wall striated longitudinally.

Female (Fig. 196). Tergum VIII anteriorly with a single or double unciform sclerotization. Ductus bursae longer than dorsal pronotal spines.

Hosts. Microtinae ; *orientalis* exceptional in occurring on *Citellus.*

hypanis hypanis Ioff, 1950, *Med. Parazitol., Moskva* 19 : 272, Caucasus.

hypanis riciensis Ioff, 1953, *Med. Parazitol., Moskva* 22 : 464. Gruziya.

iranus iranus Argyropulo, 1935, *Z. Aserb. Inst. Microbiol.* 5 : 193, figs. 71, 73(6). Transcaucasus.

iranus persicus Smit, 1960, *Bull. Brit. Mus.* (*nat. Hist.*), *Ent.* 8 : 341, figs. 10–13. Iran.

orientalis (Wagner, 1898), *Horae Soc. ent. ross.* 31 : 591, pl. 10 fig. 30 (as *Typhlopsylla*). East and central Europe from steppes north of Caspian Sea to East Germany and Austria.

wagneri wagneri Tiflov, 1927, *C. R. Congr. antipest. U.R.S.S.* : 272, figs. 1, 2. Caucasus area.

wagneri krym Ioff, 1953, *Med. Parazitol., Moskva* 22 : 464. Crimea.

wagneri schuriscus Ioff, 1940, *Mag. Parasit., Leningr.* 7 : 218, fig. 10. Caucasus.

pisticus-subgroup

Labial palp reaching to ¾ length of fore coxa.

Male (Figs. 57, 94, 154). Tergum VIII with one or a few setae in front of the spiracular fossa. Sternum VIII short, middle of posterior margin broadly concave. Dorsal lobe of fixed process of clasper well developed, as is the triangular ventral lobe. Distal arm of sternum IX long and of medium width. Movable process narrowed in lower half. Phallosome : aedeagus only a little expanded dorsally ; dorso-apical sclerite narrow and fairly long ; hamulus broad and short, feebly sclerotized ; ventro-apical angle of lateral wall drawn out into a curved sharp process.

Female. Tergum VIII without an unciform sclerotization ; with setae anterior to spiracular fossa. Ductus bursae shorter than dorsal pronotal spines.

Hosts. Sciuridae.

pisticus pisticus Jordan & Rothschild, 1921, *Ectoparasites* 1 : 134, fig. 109. Siberia.

pisticus pacificus Ioff & Scalon, 1950, *Med. Parazitol., Moskva* 19 : 271. Russian Far East.

parcus-group

Head (Figs. 14, 15). Area communis absent in both sexes. Eye vestigial. First genal spine a little shorter and narrower than the second ; ratio of spines 1 : 1·2 : 1·5 or 1·6. Labial palp reaching to two-thirds or ¾ the length of the fore coxa ; with a curved apical seta. Anterior occipital row of two setae, middle row of three and the interspace between the upper two is smaller than between the lower two.

Thorax. Pronotum shorter than length of pronotal spines. Pronotal ctenidium with 18 spines in both sexes. Normal arrangement of pseudosetae under mesonotal collar. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa dorsally interrupted. Longest apical seta of second hind tarsal segment reaching to about the middle of the fourth segment. Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped. One seta (the lowest of the tergal main rows) below the level of the tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 103, 104, 155, 156). Tergum VIII without setae anterior to spiracular fossa. Sternum VIII with a finely serrate rounded posterior margin. Apodeme of tergum IX with an area fusoria. Corpus of clasper with a small triangular ventral internal incrassation in *C. formosanus* only, the incrassation apparently absent in the other species. Fixed process of clasper divided by a shallow sinus into two short or very short lobes, the lower (ventro-posterior) of which is not sinuate. Dorsal lobe of fixed process with three or four long setae. Ventral lobe of fixed process with a small seta. Movable process roughly quadrangular, with only four longish basiconiform sensilla along the dorso-anterior angle. Fovea circular or oval. Four tetrad setae, placed well below the sclerotized dorso-posterior angle. Distal arm of sternum IX very short or of medium length, with at least some of its setae longish. Aedeagus with a fairly small triangular dorsal expansion and without a ventro-basal sclerotization ; dorso-apical sclerite with a long and narrow dorsal extension ; aedeagal apodeme narrow and apically curved upwards.

Female (Fig. 208). Sternum VII with a well developed dorsal lobe. No setae anterior to the spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded. Tergum VIII relatively very short and anteriorly with or without an unciform sclerotization. The apical seta of the preventral row of tergum VIII not much differentiated from the other setae and well separated from and not placed right above the penultimate seta. Sternum VIII well sclerotized over its entire length especially basally. Ductus bursae shorter than dorsal pronotal spines. Spermatheca small ; hilla shorter than bulga.

Distribution. EASTERN ASIA.

Hosts. Microtine rodents, especially on *Eothenomys*.

dinormus Jordan, 1932, *Novit. zool.* 38 : 288, fig. 47. Szechuan.
formosanus Svihla, 1942, *Pan-Pacif. Ent.* 18 : 133, figs. 1–3. Formosa.
parcus Jordan, 1932, *Novit. zool.* 38 : 286, 288, figs. 44–45. Szechuan.
quadratus Liu & Wu, 1960, *Acta ent. sinica* 10 : 172, pl. 1, figs. 4–6, 10–12. Yunnan.
yunnanus Jordan, 1932, *Novit. zool.* 38 : 287, fig. 46. Yunnan.

***dux*-group**

Head. Area communis absent in male, present in female. Eye vestigial. First genal spine shorter and narrower than second spine ; ratio of spines 1 : 1·2 : 1·5. Labial palp reaching to ¾ the length of the fore coxa ; with a curved apical seta. Anterior occipital row of two, sometimes three, setae ; middle row of three setae and the interspace between the upper two smaller than between the lower two.

Thorax. Pronotum somewhat shorter than length of pronotal spines. Pronotal ctenidium with 14 (occasionally 16) spines in both sexes. Normally only one or two subdorsal pseudosetae under mesonotal collar. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa dorsally interrupted. Longest apical seta of second hind tarsal segment reaching to beyond the apex of the fourth segment. Four pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen (Fig. 40). Spiracular fossae of metepimeron and terga II–VII relatively small and longish, the one of tergum VIII Y-shaped (Fig. 40). One seta (the lowest of the tergal main rows) below the level of the tergal spiracular fossae. Basal sternum with one or a few lateral setae in both sexes.

Male (Fig. 63, 95, 158). Sternum VIII with a smooth, rounded posterior margin, ventro-apically with a small sharp projection (Fig. 63). Apodeme of tergum IX with an area fusoria. Corpus of clasper without an internal ventral incrassation. Fixed process of clasper divided by a deep and fairly narrow sinus into a triangular dorsal lobe bearing three to five large setae and a finger-like lower lobe with a longish apical seta. Acetabular seta absent. Movable process long and rather narrow, gradually tapering towards a narrow apex ; with about 15 basiconiform sensilla along the dorso-anterior margin. Fovea absent. Four tetrad setae placed a little below the dorso-posterior angle. Distal arm of sternum IX as long as proximal arm, of unusual shape (Fig. 95) and with short setae only. Aedeagus without a marked dorsal expansion and basally only slightly sclerotized ; dorso-apical sclerite large ; lateral wall ventro-apically drawn out into an elongate blunt-tipped projection.

Female (Fig. 203). Sternum VII bilobed. A few short setae anterior to the spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded. Tergum VIII anteriorly without an unciform sclerotization. The apical short and stout seta of the preventral row of tergum VIII well separated from, and placed obliquely above, the penultimate seta. Sternum VIII with a short but fairly broad apex ; base of sternum VIII not strongly sclerotized. Ductus bursae about as long as dorsal pronotal spines. Spermatheca of a rather unusual shape, without a sharp demarcation between hilla and bulga (Fig. 203).

Distribution. CENTRAL ASIA.

Host. *Ellobius talpinus.*

dux Jordan & Rothschild, 1915, *Ectoparasites* 1 : 22, figs. 26, 27. Central Asia.

dolichus-group

Setae relatively very long and thin. *Head* (Figs. 16, 17). Area communis absent in male, present in female. Eye clearly indicated. First genal spine shorter and narrower than second, third spine in female not markedly longer than second (it is in ♂) ; ratio of spines ♂ 1 : 1·3 : 1·8, ♀ 1 : 1·3 : 1·5. Setae of frontal row quite long, especially in male. Labial palp reaching to apex of fore coxa ; with a curved apical seta. Anterior occipital row of two setae, middle row of three and the interspace between the upper two is smaller than between the lower two.

Thorax (Fig. 44). Pronotum shorter than length of pronotal spines. Pronotal ctenidium with 14 spines in both sexes. Arrangement of pseudosetae under mesonotal collar abnormal, see Fig. 44. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching to beyond apex of fourth segment. Three pairs of lateral plantar setae on fifth hind tarsal segment, but *dolichus quadrinus* is stated to have four pairs.

Abdomen (Fig. 38). Spiracular fossae of metepimeron and terga II–VII small, elongate and somewhat constricted subapically (Fig. 38), the one on tergum VIII Y-shaped. One seta (the lowest of the tergal main rows) below the level of the spiracular fossae. Basal sternum occasionally with one or a few lateral setae in the female only.

Male (Figs. 55, 96, 157). Sternum VIII posteriorly forming an elongate triangular poorly sclerotized lobe (Fig. 55). Apodeme of tergum IX without an area fusoria. Corpus of clasper without an internal ventral incrassation. Manubrium short. Fixed process of clasper divided into a broad upper lobe, bearing two to five long setae and a finger-like ventral lobe which lacks an apical short seta. Acetabular seta absent. Movable process elongate, not unlike the shape of a sugar-loaf ; upper (anterior) acetabular portion straight (unique in the genus) ; with 15 or more mostly long and slender basiconiform sensilla along the dorso-anterior margin. Fovea circular or oval. Four tetrad setae, situated well below dorso-posterior angle of movable process. Distal arm of sternum IX of medium length and tapering apically, with at least some of its setae long. Aedeagus without a dorsal expansion and without a ventro-basal sclerotization ; aedeagal apodeme narrow.

Female (Fig. 200). Posterior margin of sternum VII bilobed. One or a few short setae anterior to the spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded. Tergum VIII anteriorly without an unciform sclerotization. The apical short and stout seta of the preventral row of tergum VIII well separated from and not placed above the penultimate seta. Sternum VIII with a short sclerotized narrow apex ; base of sternum VIII not strongly sclerotized. Ductus bursae shorter than dorsal pronotal spines. Spermatheca normal, hilla shorter than bulga.

Distribution. ASIA (from Caspian Sea to Mongolia).

Hosts. Gerbillinae.

dolichus dolichus Rothschild, 1913, *Ann. Mag. nat. Hist.* 8(12) : 539, pl. 14, figs. 1, 2. Turkestan.

dolichus bair Ioff, 1940, *Mag. Parasit. Leningr.* 7 : 220, 228, figs. 13, 15. Transcaspia.

dolichus idae Ioff, 1940, *Mag. Parasit. Leningr.* 7 : 222, 228, fig. 14. Turkestan.

dolichus kysyl Ioff, 1953, *Med. Parazitol., Moskva* [22] (5) : 463. Uzbekistan.
dolichus quadrinus Ioff, 1953, *Med. Parazitol., Moskva* [22] (5) : 463, Kirgizia.
dolichus ursat Ioff, 1953, *Med. Parazitol., Moskva* [22] (5) : 463. Turkestan.
dolichus ustjurt Ioff, 1940, *Mag. Parasit. Leningr.* 7 : 220, 228, fig. 12. Transcaspia.

dilatatus-group

Head (Fig. 11). Area communis absent in male, present in female. Eye vestigial. Spines of genal comb relatively short, the first a little shorter than the second ; ratio of spines ♂ 1 : 1·3 : 1·5, ♀ 1 : 1·3 : 1·4. Labial palp reaching to well beyond the apex of the fore coxa ; with a curved apical seta. Anterior occipital row and middle row of two setae each.

Thorax (Fig. 45). Pronotum dorsally longer than length of pronotal spines. Pronotal ctenidium with 14 spines in both sexes. Pseudosetae under mesonotal collar arranged as in Fig. 45. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa dorsally interrupted. Longest apical seta of second hind tarsal segment reaching to beyond the apex of the fourth segment. Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen (Fig. 39). Spiracular fossae of metepimeron and terga II–VII small, longish and somewhat constricted in the middle, the one on tergum VIII Y-shaped (Fig. 39). One or two setae of the tergal main rows below the level of the tergal spiracular fossae. Basal sternum with some lateral setae in female only.

Male (Figs. 61, 97, 159). Sternum VIII abnormal, see Fig. 61 ; with a smooth posterior margin ; tergum VIII with several small setae anterior to the spiracular fossa. Apodeme of tergum IX with a very small area fusoria. The corpus of clasper without an internal ventral incrassation ; manubrium large. Dorsal lobe of fixed process with about half-a-dozen large setae ; ventral lobe divided into a squarish (median) lobe, bearing the short apical seta and situated below the movable process, and a rounded ventral lobe with 4–6 marginal setae. Movable process quadrangular, with 15 or more basiconiform sensilla along the rounded dorso-anterior margin. Fovea elongate. Five tetrad setae, situated well below dorso-posterior angle of movable process. Distal arm of sternum IX of medium length but very broad, with short setae only. Aedeagus without a dorsal expansion and without a ventro-basal sclerotization ; aedeagal apodeme straight and very narrow ; lunular sclerite bulbiferous dorso-anteriorly (a most unusual modification).

Female (Fig. 199). Sternum VII with a lateral sinus dividing a large dorsal triangular lobe from a much smaller ventral one. A number of small setae anterior to the spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded. Tergum VIII anteriorly without an unciform sclerotization. The apical stout seta of the preventral row of tergum VIII well separated from and not placed above the penultimate seta. Sternum VIII with a short and rather narrow apex ; base of sternum VIII strongly sclerotized. Ductus bursae shorter than dorsal pronotal spines. Spermatheca of normal shape and size ; hilla shorter than bulga.

Distribution. CENTRAL ASIA.

Host. *Myospalax.*

dilatatus Wagner, 1928, *Annu. Mus. zool. Acad. St. Pétersb.* 30 : 27, fig. 7. Central Asia.

spalacis-group

Head (Fig. 4). Area communis absent in male, present in female. Frontal wall fairly thick. Eye vestigial. Genal spines rather stout and blunt, with a distinct gap between the first and the second spines ; ratio of spines ♂ 1 : 1·2 : 1·5, ♀ 1 : 1·1 : 1·5. Labial palp reaching to ¾ length of fore coxa or to the apex ; with a curved apical seta. Anterior occipital row of one or two setae, middle row of 1–4 setae. The interspace between the lowest and the penultimate setae of the posterior occipital row is not much larger than those between the other setae of the row.

Thorax. Pronotum dorsally about as long as pronotal spines. Pronotal ctenidium with 16 spines in *spalacis* and *jeanneli* (in the latter occasionally 17 or 18), with 18 spines in *gigantospalacis*. Normal arrangement of mesonotal pseudosetae. Metepimeron with more than ten setae.

Legs. Sulcus of mid coxa completely interrupted. Longest apical seta of second hind tarsal segment reaching from the middle to beyond apex of fourth segment. Three or four pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen (Fig. 36). Spiracular fossae of metepimeron and terga II–VII almost circular, that of tergum VIII Y-shaped (Fig. 36). More than one seta of tergal main rows below level of tergal spiracular fossae, at least on the anterior terga. Basal sternum with some lateral setae in both sexes. Cuticular ridges of this sternum parallel.

Male (Figs. 98, 160). Sternum VIII with a finely serrate rounded posterior margin. Apodeme of tergum IX with an area fusoria. Corpus of clasper with a long and narrow horizontal internal ventral incrassation. Fixed process of clasper divided by a deep sinus into two lobes ; the dorsal lobe bears 3–5 large setae, the ventral lobe with a small apical seta ; acetabular seta often not quite marginal. Movable process relatively broad, wider dorsally than ventrally, with about 10–15 sensilla along the anterior margin. Fovea elongate. Three tetrad setae, situated well below the sclerotized dorso-posterior angle. Distal arm of sternum IX of medium length or about as long as proximal arm, with relatively large number of long slender setae. Aedeagus dorsally only slightly expanded ; dorso-apical sclerite stout, with a relatively short upright finger-like projection ; hamulus well sclerotized ; median lamella of aedeagal apodeme narrow.

Female (Fig. 197). Posterior margin of sternum VII with a large triangular or squarish dorso-lateral lobe. Some small setae anterior to spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded ; tergum VIII with or without an unciform sclerotization ; the short and stout apical seta of the preventral row placed obliquely above the penultimate seta of the row ; 8–12 genital setae. Sternum VIII well sclerotized over whole of its length. Ductus bursae longer than dorsal pronotal spines. Spermatheca small, hilla about as long as bulga.

Distribution. ROMANIA, CAUCASUS area, KAZAKHSTAN.

Hosts. *Spalax* spp.

spalacis Jordan & Rothschild, 1911, *Novit. zool.* 18 : 82, fig. 8. Southern European part of U.S.S.R.

gigantospalacis gigantospalacis Ioff, 1929, *Ber. mikrobiol. Staatsinst. Rostow* (8) : 40, figs. 3B, 5B, 6, 7. Gruzinskaya S.S.R.

gigantospalacis uralospalacis Tiflov & Usov, 1939, *Rev. Microbiol., Saratov* 17 : 144, figs. 3, 4. Kazakhstan.

jeanneli Jordan. 1929, *Novit. zool.* 35 : 178, figs. 9, 10. Romania.

caucasicus-group

Head. Area communis absent in male, present in female. Frontal wall fairly thick. Eye vestigial. First genal spine almost as long as second ; ratio of spines 1 : 1·2 : 1·5. Labial palp reaching to ¾ length of fore coxa or to the apex ; with a curved apical seta. Anterior occipital row of one or two setae, middle row of 1–4 setae. The interspace between the lowest and the penultimate setae of the posterior occipital row is not much larger than those between the other setae of the row.

Thorax. Pronotum dorsally about as long as pronotal spines. Pronotal ctenidium with 16 spines in male, 14 in female. Arrangement of pseudosetae under mesonotal collar abnormal, see Fig. 43. Metepimeron with about half-a-dozen setae.

Legs. Sulcus of mid coxa dorsally interrupted. Longest apical seta of second hind tarsal segment reaching to the middle of the fourth segment. Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II–VII circular or broad oval, that of tergum VIII Y-shaped. More than one seta of tergal main rows below level of tergal spiracular fossae, at least on the anterior terga. Basal sternum with some lateral setae in the female only. Cuticular ridges of this sternum parallel.

Male (Figs. 67, 99, 161). Sternum VIII with a rounded posterior margin which is partially minutely serrate. Apodeme of tergum IX with an area fusoria in *caucasicus* only. Corpus of clasper with an internal ventral incrassation in *caucasicus* only. Fixed process of clasper with at most a rather shallow sinus dividing the dorsal lobe from the ventral lobe ; the lower lobe with a small apical seta. Three or four long setae and several shorter ones on fixed process ; acetabular seta not quite marginal. Movable process elongate and broadest in the middle ; with about 10–15 sensilla along the anterior margin. Fovea elongate or poorly indicated. The four tetrad setae are situated well below the rounded dorso-posterior angle. Distal arm of sternum IX of medium length, apical half of distal arm with a number of short setae and several long ones. Aedeagus dorsally not expanded ; lateral wall ventro-posteriorly drawn out into a claw-like lobe ; dorso-apical sclerite not very large ; hamulus quadrangular and very distinct ; median lamella of aedeagal apodeme narrow.

Female (Fig. 204). Posterior margin of sternum VII with a rounded or squarish dorso-lateral lobe. Several small setae anterior to the spiracular fossa of tergum VIII. Posterior margin of tergum VIII rounded, without a sinus ; apical seta of preventral row well separated from penultimate seta and not placed above the latter ; tergum VIII without an unciform sclerotization. Sternum VIII apically broad (in *ruris*) or pointed (in *caucasicus* and *monticola*). Ductus bursae as long as dorsal pronotal spines (in *ruris* and *monticola*) or longer (in *caucasicus*). Spermatheca normal, hilla as long as bulga (in *ruris*) or shorter (in *caucasicus* and *monticola*).

Distribution. SOUTH-EASTERN EUROPE.

Hosts. *Spalax* spp.

caucasicus (Taschenberg, 1880), *Die Flöhe* : 94, pl. 4 figs. 26, 26a. Hungary, Yugoslavia.

ruris Jordan, 1929, *Novit. zool.* 35 : 180, fig. 11. Romania, Yugoslavia.

monticola (Kohaut, 1904), *Ann. hist.-nat. Mus. hung.* 2 : 87, fig. A. Yugoslavia.

***fissurus*-group**

Head. Area communis absent in male, present in female. Eye vestigial or fairly distinct. First genal spine almost as long and broad as second from which it is usually separated by a small gap ; ratio of spines 1 : 1·2 : 1·5. Labial palp reaching to ¾ length of fore coxa ; without apical curved seta. Anterior occipital row of 1 or 2 setae, middle row of only one seta. Interspace between lowest and penultimate setae of posterior occipital row not much larger than those between the other setae of the row.

Thorax. Pronotum dorsally about as long as pronotal spines. Pronotal ctenidium with 14 (occasionally 15) spines in *turcicus* and *fissurus*, 18 in *inornatus*. Normal arrangement of mesonotal pseudosetae. Metepimeron with more than 10 setae.

Legs. Sulcus of mid coxa completely interrupted. Longest apical seta of second hind tarsal segment reaching to apex of fourth segment. Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II—VII almost circular, that of tergum VIII Y-shaped. More than one seta of tergal main rows below level of tergal spiracular fossae, at least on the anterior terga Basal sternum with or without some lateral setae in both sexes Cuticular ridges of this sternum parallel

Male (Figs 100, 101, 162, 163) Sternum VIII with a smooth, rounded, posterior margin. Apodeme of tergum IX with an area fusoria. Corpus of clasper with or without a narrow upright internal ventral sclerotization Fixed process of clasper non-sinuate, with 4–6 long setae and several shorter ones Movable process elongate triangular, with about ten sensilla along the anterior margin Fovea elongate or indistinct. Four tetrad setae, situated well below the sclerotized dorso-posterior angle of the movable process. Distal arm of sternum IX a little shorter than proximal arm, with a number of long, slender setae. Aedeagus with a pre-apical dorsal expansion ; dorso-apical sclerite long and slender ; hamulus rather small and narrow ; lateral wall with a ventral lobe pre-apically ; median lamella of aedeagal apodeme narrow.

Female (Fig. 205). Posterior margin of sternum VII with a bilobed upper lobe. Some small setae anterior to spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded ; tergum VIII without an unciform sclerotization. Sternum VIII well sclerotized over whole of its length. Ductus bursae shorter than dorsal pronotal spines in *fissurus* and *turcicus*, longer in *inornatus* Spermatheca small, hilla about as long as bulga.

Distribution. ASIA MINOR, CAUCASUS.

This group can be divided into two sub-groups :

fissurus-subgroup

Eye vestigial Pronotal ctenidium with 14 spines in both sexes. Basal sternum with some lateral setae in both sexes Corpus of clasper with an internal ventral sclerotization. Aedeagus without a large ventro-basal sclerotization Ductus bursae shorter than dorsal pronotal spines.

Hosts. *Spalax* spp.

fissurus Wagner, 1928, *Annu. Mus. zool. Acad. St. Pétersb.* 30 : 29, fig. 8. Asia Minor, Caucasus.

turcicus Jordan, 1946, *Proc. R. ent. Soc. Lond.*, (B) 15 : 52, figs. 1, 2. Asia Minor.

inornatus-subgroup

Eye clearly indicated. Pronotal ctenidium with 18 spines in both sexes. Basal sternum without lateral setae. Corpus of clasper without internal ventral sclerotization. Aedeagus with a well-developed ventro-basal sclerotization. Ductus bursae longer than dorsal pronotal spines.

Host. *Prometheomys schaposchnikowi.*

inornatus Wagner, 1916, *Bull. Mus. Caucase* 10 : 56. Asia Minor, Caucasus.

rettigi-group

Head (Fig. 3). Area communis present in both sexes. Eye clearly indicated First genal spine shorter than second and sharply pointed ; ratio of spines 1 : 1·3 : 1·7. Labial palp reaching to ¾ length of fore coxa ; without a subapical curved seta. Anterior occipital row of two setae, middle row also of two setae.

Thorax. Pronotum as long as or a little shorter than pronotal spines. Pronotal ctenidium with 18 (occasionally 17 or 19) spines in both sexes Arrangement of pseudosetae under mesonotal collar normal. About half-a-dozen setae on metepimeron.

Legs Sulcus of mid coxa completely interrupted Longest apical seta of second hind tarsal segment reaching at most to middle of segment IV Three pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen (Fig. 37). Spiracular fossae of metepimeron and terga II—VII small and longish, that of tergum VIII Y-shaped (Fig. 37). One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum with some lateral setae in female only.

Male (Figs. 52, 105, 106, 164, 165). Sternum VIII with a smoothly rounded posterior margin which is ventrally sinuate. Apodeme of tergum IX without an area fusoria. Corpus of clasper with a narrow upright internal ventral incrassation. Fixed process of clasper broad, with at most a very shallow sinus, the apical seta of the ventral lobe present ; the process with three large setae, two of which are in the acetabular area, and a number of smaller marginal setae. Movable process elongate, gradually tapering towards a narrow apex ; four or five sensilla along the dorso-anterior margin and a patch of striations at the anterior margin opposite the posterior margin of the fixed process. Fovea absent. Four tetrad setae situated well below apex of movable process. Distal arm of sternum IX of medium length or about as long as proximal arm. Aedeagus without an expansion in the middle of the dorsal margin and without a ventro-basal sclerotization ; subapically the dorsal margin bears a papilliform sclerotization ; ventro-posterior angle of aedeagal lateral wall produced into a rather narrow lobe ; hamulus either large or small ; aedeagal apodeme narrow.

Female (Fig. 201). Sternum VII with a large obtuse lateral lobe ; with one or a few setae anterior to the spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded. Tergum VIII anteriorly without unciform sclerotization. Apical short seta of preventral row of tergum VIII not thicker than the slender penultimate one ; both setae are marginal and well separated from each other. About a dozen genital setae. Sternum VIII with a broad apex ; base of sternum VIII not strongly sclerotized. Ductus bursae at most as long as dorsal spines of pronotal ctenidium. Spermatheca of usual shape, rather small in *acuminatus ;* hilla shorter than bulga.

Distribution. ROMANIA, ASIA MINOR, CAUCASUS.

Hosts. Cricetid rodents.

acuminatus Ioff & Argyropulo, 1934, *Z. Parasitenk.* 7 : 157, figs. 14, 15. Caucasus.

rettigi Rothschild, 1908, *Proc. zool. Soc. Lond.* (1908) : 624, pl. 28 figs. 3, 4. Asia Minor, Caucasus, Romania.

***triodontus*-group**

Head (Fig. 13). Area communis present in both sexes. Frontal wall fairly thick. Eye vestigial. First genal spine almost as stout and blunt as the second, from which it is separated by a distinct gap ; ratio of spines ♂ 1 : 1·2 : 1·6, ♀ 1 : 1·3 : 1·7. Labial palp reaching to ¾ length of fore coxa or to the apex ; without a curved apical seta. Anterior occipital row of 2–4 setae, middle row of three or four setae.

Thorax. Pronotum shorter than length of pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Three or four pseudosetae under mesonotal collar which are often equally spaced. Metepimeron with more than 10 setae.

Legs. Sulcus of mid coxa completely interrupted. Number of dorso-lateral setal notches in hind tibia varying from 7–9, though seven is the usual number. Longest apical seta of second hind tarsal segment reaching to the apex of fourth segment or a little beyond. Fifth hind tarsal segment with three or four pairs of lateral plantar setae.

Abdomen (Fig. 41). Spiracular fossae of metepimeron and terga II–VII circular or broad oval, that of tergum VIII Y-shaped (Fig. 41). More than one seta of tergal main rows below level of tergal spiracular fossae. Basal sternum of female with lateral setae (in *edwardsi* and *audax*) or without (in *triodontus*) ; cuticular ridges of this sternum finger-print-like.

Male (Figs. 108–110, 166–168). With 1–5 setae anterior to spiracular fossa of tergum VIII. Sternum VIII with a rounded smooth posterior margin. Apodeme of tergum IX with an area fusoria. Corpus of clasper with at most a relatively small internal ventral incrassation. Fixed process of clasper with 3–5 marginal or submarginal setae and one acetabular seta, which is separated by a wide gap from the other large setae in *triodontus* only, and without a developed upper lobe ; ventral lobe with a longish dorso-apical seta. Movable process triangular or elongate, with 5–10 sensilla along the anterior (apical) margin. Fovea absent. Four tetrad setae in *triodontus* and *edwardsi*, 6–7 in *audax ;* these setae are situated at the dorso-posterior angle in *edwardsi* and a little below this angle in *triodontus* and *audax*. Dorso-posterior angle of movable process sclerotized. Distal arm of sternum IX of medium length, with at least some of its setae longish. Aedeagus with a very large triangular dorso-apical sclerite and with the apical part of the ventral margin of the lateral wall divided by a wide sinus into two pointed lobes ; median lamella of aedeagal apodeme narrow.

Female (Fig. 207). Posterior margin of sternum VII with a rather large dorso-lateral lobe. No setae anterior to spiracular fossa of tergum VIII. Posterior margin of tergum VIII with at most a rather shallow sinus. Ventro-posterior setae of tergum VIII marginal except in *audax* where they are placed some distance away from the margin. Tergum VIII without an unciform sclerotization. Apex of sternum VIII acute in *triodontus* and *audax*, broadly rounded in *edwardsi*. Ductus bursae about as long as dorsal spines of pronotal ctenidium in *triodontus* and *edwardsi*, longer than those spines in *audax*. Hilla of spermatheca shorter than bulga ; spermatheca normal.

Distribution. EAST AFRICA.

Hosts. *Tachyoryctes* spp.

audax Jordan & Rothschild, 1913, *Novit. zool.* 20 : 546, 549, 560, figs. 17, 18. Kenya.

edwardsi Jordan, 1937, *Novit. zool.* 40 : 329, figs. 102, 103. Kenya.

triodontus Rothschild, 1907, *Novit. zool.* 14 : 330, figs. 2, 3 [not fig. 4 ; see 1912, *Novit. zool.* 19 : 365, footnote]. Presumably East Africa.

***particularis*-group**

Head (Fig. 18). Area communis present in both sexes. Eye vestigial. Spines of genal ctenidium relatively large, the first two bluntly tipped ; ratio of spines 1 : 1·5 : 1·8. Labial palp reaching to about middle of fore coxa ; without a curved apical seta. Frontal row of five or six setae. Anterior and middle occipital rows each with two setae.

Thorax (Figs. 18, 19). Pronotum expanded dorso-apically ; pronotal ctenidium of 12 curved spines in both sexes, the two lowest of which are the longest ; ctenidium distinctly curved, specially so in the female and all spines point downwards and backwards. Two subdorsal pseudosetae and one in the middle of the mesonotal collar. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching to about two-thirds of third segment. Four pairs of lateral plantar setae on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped but fairly broad basally. One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 58, 107, 170). Sternum VIII with a smooth posterior margin and a ventral sinus (Fig. 58). Apodeme of tergum IX narrow, without an area fusoria. Corpus of clasper without a projecting internal ventral incrassation. Fixed process of clasper with a shallowly concave posterior margin, dorsally with one long and several shorter setae ; one acetabular seta. Movable process spindle-shaped, with four hair-like sensilla at the apex and four very small tetrad setae at the middle of the posterior margin. Fovea circular. Distal arm of sternum IX of medium length, with about half-a-dozen long and slender apical setae and several shorter preapical ones. Aedeagus without a dorsal expansion and without a ventro-basal sclerotization ; dorso-apical sclerite elongate ; lateral wall with curved striae and sinuate ventro-posteriorly ; aedeagal apodeme narrow.

Female (Fig. 209). Sternum VII with a broad and straight lateral lobe. No setae anterior to spiracular fossa of tergum VIII. Posterior margin of tergum VIII with a rounded lobe ; anteriorly without unciform sclerotization. Apical seta of tergum VIII long. Sternum VIII very narrow, with a pointed apex ; base of sternum VIII not strongly sclerotized. Ductus bursae shorter than dorsal spines of pronotal ctenidium. Bulga of spermatheca relatively very small, about as long as hilla.

Distribution. EASTERN CONGO and N.E. TANGANYIKA.

Hosts. Soricid insectivores?

particularis Berteaux, 1949, *Rev. Zool. Bot. afr.* 41 : 343, figs. 1–3. Eastern Congo Republic (Kivu), N.E. Tanganyika.

***pseudagyrtes*-group**

Head. Area communis absent in male, present in female, eye clearly indicated. First genal spine a little shorter and narrower than second ; ratio of spines ♂ 1 : 1·1 : 1·4, ♀ 1 : 1·2 : 1·5. Labial palp reaching to ¾ (or a little beyond) length of fore coxa ; with a curved apical seta. Anterior occipital row of two setae, middle row of three and the interspace between the upper two is smaller than between the lower two.

Thorax. Pronotum shorter than length of pronotal spines. Pronotal ctenidium with 16 spines in male (sometimes 14 ?), 14 in female. Normal arrangement of pseudosetae under mesonotal collar. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching to about apex of third segment. Three pairs of lateral plantar setae on fifth hind tarsal segment but four pairs in *expansus.*

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, the one on tergum VIII Y-shaped. One seta (the lowest of the tergal main rows) below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 53, 102, 169). Tergum VIII with one or a few setae anterior to spiracular fossa ; sternum VIII with a partially finely serrate posterior margin which tapers to a rounded ventro-posterior angle. Apodeme of tergum IX without an area fusoria. Corpus of clasper with a triangular internal ventral incrassation. Fixed process of clasper divided by a fairly wide sinus into two lobes, the lower of which is not sinuate. Dorsal lobe of fixed process with three to five large setae. Ventral lobe of this process with a small dorso-apical seta. Movable process elongate or spindle-shaped. Antero-dorsal margin of this process rounded, without a distinct angle, along this margin five to ten sensilla. Fovea oval. Four tetrad setae, situated well below apex of movable process. Dorso-posterior angle of movable process usually sclerotized. Distal arm of sternum IX of medium length or about as long as proximal arm, with at least some of its setae longish. Aedeagus without a median dorsal expansion and without a ventro-basal sclerotization ; aedeagal apodeme narrow.

Female (Fig. 202). Sternum VII bilobed or with a single large lateral lobe. No setae anterior to spiracular fossa of tergum VIII. Posterior margin of tergum VIII broadly rounded. Tergum VIII anteriorly without an unciform sclerotization. The apical seta of preventral row of tergum VIII not stouter than penultimate seta and placed obliquely above the latter. Sternum VIII with a short sclerotized narrow apex ; base of sternum VIII not strongly sclerotized. Ductus bursae about as long as or longer than dorsal pronotal spines. Spermatheca of normal shape and size, hilla shorter than bulga.

Distribution. Nearctic Region.

Hosts. Small rodents (Murinae, Microtinae).

caballeroi Barrera & Machado, 1960, *Homenaje Dr. E. Caballero y C.* : 549, figs. 1–4. Mexico.

expansus Traub, 1950, *Fieldiana, Zool. Mem.* 1 : 70, pl. 41 figs. 1–5. Mexico.

haagi Traub, 1950, *Fieldiana, Zool. Mem.* 1 : 68, pl. 40 figs. 1–11. Mexico.

pseudagyrtes pseudagyrtes Baker, 1904, *Proc. U.S. nat. Mus.* 27 : 420, 421, pl. 11, figs. 7–12. North America (westward to the Rocky Mountains).

pseudagyrtes micropus Traub, 1950, *Fieldiana, Zool. Mem.* 1 : 73, pl. 43, figs. 4, 7–9. Mexico.

sanborni Traub, 1950, *Fieldiana, Zool. Mem.* 1 : 72, pl. 42, figs. 1–11. Guatemala and El Salvador.

moratus-group

Head (Fig. 12). Area communis present in both sexes. Eye well-developed, dark. Frons with a marginal short seta in a notch just above the oral angle. First genal spine a little shorter and narrower than second ; ratio of spines 1 : 1·4 : 1·7. Labial palp not reaching beyond two-thirds length of fore coxa ; without a curved apical seta. Anterior occipital row of three (occasionally four) setae, middle row of 3–5 setae.

Thorax. Pronotum dorsally about as long as pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Normal arrangement of mesonotal pseudosetae. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching at most to just over apex of third segment. Fifth hind tarsal segment with four pairs of lateral plantar setae (occasionally three on one side in *moratus*).

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped. One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 111, 171). Tergum VIII with 3–5 setae anterior to spiracular fossa. Sternum VIII with a smooth, rounded or broadly truncate posterior margin. Apodeme of tergum IX with an area fusoria. Corpus of clasper with a triangular internal ventral incrassation. Fixed process of clasper divided by a shallow sinus into two lobes ; with 3–4 stout setae and a marginal acetabular seta ; ventral lobe without a small dorso-apical seta. Movable process elongate and widest in the middle ; with 10–14 sensilla along anterior margin and dorso-anterior angle ; three tetrad setae, of which the upper one is very short and the middle one long, placed well below dorso-posterior angle ; margin of movable process immediately above tetrad setae angular and strongly sclerotized, dorso-posterior angle also markedly sclerotized. Fovea elongate. Distal arm of sternum IX variable in length, from very short to medium, with several long setae. Aedeagus without a dorsal expansion in the middle ; dorso-apical sclerite very long ; no ventro-basal sclerotization ; aedeagal apodeme relatively very broad.

Female (Fig. 210). Sternum VII with an entire or sinuate dorsal lobe. Anterior to spiracular fossa of tergum VIII 1–4 small setae. Posterior margin of tergum VIII without a sinus. Tergum VIII anteriorly with or without an unciform sclerotization. None of the setae of tergum VIII marginal. Sternum VIII long and narrow, its posterior half well sclerotized. Ductus bursae much longer than dorsal pronotal spines. Spermatheca of normal shape and size ; hilla longer than bulga.

Distribution. WEST AFRICA.

Hosts. Murid rodents.

moratus Jordan, 1926, *Novit. zool.* 33 : 393, figs. 20–22. Ghana.

acunus Jordan, 1929, *Novit. zool.* 35 : 166, figs. 2, 4. Nigeria.

tertius Smit, 1960, *Tijdschr. Ent.* 103 : 281, figs. 8–11. Ivory Coast.

atomus-group

Head. Area communis present in both sexes. Eye fairly well-developed, dark. First genal spine shorter and narrower than second ; ratio of spines ♂ 1 : 1·4 : 1·7, ♀ 1 : 1·6 : 1·9. Labial palp reaching to two-thirds length of fore coxa ; without a curved apical seta. Anterior occipital row of 2–4 setae, middle row of three or four.

Thorax. Pronotum markedly shorter than length of pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Normal arrangement of mesonotal pseudosetae. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching almost to or beyond apex of third segment. Three or four lateral plantar setae per side on fifth hind tarsal segment.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped. One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 60, 112, 172). Tergum VIII with 3–5 setae anterior to spiracular fossa. Sternum VIII with ventral margin slightly folded, posterior margin smooth but with minute " scales " along it in *ominosus.* Area fusoria of apodeme of tergum IX very small or absent. Corpus of clasper with an upright and fairly narrow internal ventral incrassation. Fixed process of clasper with a thin acetabular extension, bearing the acetabular seta which is thus placed distantly from the four stout setae on the fixed process ; the very short ventral lobe with or without a small dorso-apical seta. Movable process rather broad, with an obliquely truncate apex ; inner surface of ventro-posterior half of movable process minutely spiculose ; along anterior margin of this process 9–12 sensilla ; fovea elongate ; five or six tetrad setae, three of which are large, placed not far below non-sclerotized dorso-posterior angle. Upper part of proximal arm of sternum IX relatively very narrow ; distal arm of medium length or about as long as proximal arm, with a number of short and very short setae. Aedeagus dorsally concave ; dorso-apical sclerite very narrow and almost inapparent ; no ventro-basal sclerotization ; hamulus large and well sclerotized ; aedeagal apodeme straight and rather narrow.

Female (Fig. 211). Posterior margin of sternum VII with a dorsal and lateral lobe which are separated by a conspicuous sinus. Above spiracular fossa of tergum VIII 3–5 small setae. Posterior margin of tergum VIII with at least an indication of a lateral sinus. Tergum VIII anteriorly without an unciform sclerotization. The two most posterior setae on the outer side of tergum VIII, above the ventro-posterior angle, are marginal. Sternum VIII narrow and well defined. Ductus bursae shorter than dorsal pronotal spines. Spermatheca normal, hilla shorter than bulga.

Distribution. ANGOLA and SOUTHERN PART OF CONGO.

Hosts. Murid rodents.

atomus Jordan & Rothschild, 1913, *Novit. zool.* 20 : 551, fig. 22. Angola.
ominosus Smit, 1959, *Rev. Zool. Bot. afr.* 60 : 326, figs. 1–5. Congo (Katanga).

evidens-group

Head. Area communis present in both sexes. Eye fairly well-developed. First genal spine shorter and narrower than second ; ratio of spines ♂ 1 : 1·2 : 1·6, ♀ 1 : 1·3 : 1·6. Labial palp reaching to two-thirds (*evidens* sspp.) or ¾ (*acanthurus, lycosius*) length of fore coxa ; without a curved apical seta. Anterior occipital row with 3–5 setae, middle row also of 3–5 setae.

Thorax. Pronotum dorsally shorter than pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Normal arrangement of mesonotal pseudosetae. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching to apex of third segment or to middle of fourth. Fifth hind tarsal segment with three or four pairs of lateral plantar setae in *lycosius* and *evidens*, four pairs in *acanthurus*.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, the one of tergum VIII Y-shaped. One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 113–115, 173–175). Tergum VIII with a small number of setae anterior to spiracular fossa. Ventral margin of sternum VIII indented. Apodeme of tergum IX with an area fusoria (sometimes very small). Corpus of clasper with a triangular internal ventral incrassation in *evidens* and *lycosius*, without one in *acanthurus*. Fixed process of clasper divided by a very shallow sinus into two lobes, the lower of which has a small dorso-apical seta in *lycosius* only ; the process with 3–5 large setae. Movable process widest apically ; about half-a-dozen sensilla along dorso-anterior angle ; four tetrad setae situated just below dorso-posterior angle of movable process. Fovea very long and narrow and well sclerotized. Distal arm of sternum IX about as long as proximal arm, with short setae only, while in *acanthurus* the apical portion of the ventral margin also bears a short row of dark spiniform setae. Lateral wall of aedeagus forming posteriorly a narrow and pointed process, except in *acanthurus ;* dorso-apical sclerite of medium length and fairly broad ; no ventro-basal sclerotization ; aedeagal apodeme of medium width.

Female. Posterior margin of sternum VII with a dorsal, or a dorsal and ventral, lateral lobe. With or without setae anterior to spiracular fossa of tergum VIII. Posterior margin of tergum VIII sinuate. Tergum VIII anteriorly without an unciform sclerotization. Ventro-posterior setae of tergum VIII marginal. Sternum VIII with a broad apex. Ductus bursae shorter than dorsal pronotal spines. Hilla of spermatheca longer than bulga in *lycosius*, shorter in *evidens* and *acanthurus*.

Distribution. EAST AFRICA.

Hosts. Murid rodents.

evidens evidens Jordan, 1929, *Novit. zool.* 35 : 165, figs. 1, 3. Eastern Congo, Uganda.

evidens elgonensis Jordan, 1938, *Novit. zool.* 41 : 114, fig. 58. Uganda (Mt. Elgon).

evidens modicus Jordan, 1933, *Novit. zool.* 38 : 349, figs. 68, 70. Kenya.

acanthurus Jordan & Rothschild, 1913, *Novit. zool.* 20 : 551, figs. 23, 24. Kenya, Tanganyika.

lycosius Jordan & Rothschild, 1913, *Novit. zool.* 20 : 554, fig. 25 (the described female, fig. 26, is that of *eumeces ;* see Jordan, 1936, *Novit. zool.* 39 : 301). Kenya.

***calceatus*-group**

Head. Area communis present in both sexes. Eye well-developed, dark. First genal spine distinctly shorter and narrower than second ; ratio of spines 1 : 1·4 : 1·8. Labial palp reaching to two-thirds length of fore coxa ; without a curved apical seta. Anterior occipital row with three or four setae, middle row of four setae (occasionally three).

Thorax. Pronotum dorsally shorter than pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Normal arrangement of mesonotal pseudosetae. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment reaching to about the apex of the third segment. Fifth hind tarsal segment with three or four lateral plantar setae per side.

Abdomen. Spiracular fossae of metepimeron and of terga II–VII conical, that of tergum VIII Y-shaped. One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male. (Figs. 59, 116, 117, 179, 180). Tergum VIII with 4–6 setae anterior to spiracular fossa. Sternum VIII with a rounded posterior margin which is ventrally minutely serrate (except in *ansorgei*) and has the appearance of being folded over in *calceatus* and *ansorgei*. Apodeme of tergum IX with an area fusoria in *bacopus* only. Corpus of clasper with a narrow upright internal ventral sclerotization. Fixed process of clasper markedly sinuate, the dorsal lobe with 3–4 large setae, ventral lobe without a small apical seta. Movable process broad ; with 12–20 sensilla along anterior margin ; with 5–7 tetrad setae placed a short distance below dorso-posterior angle of movable process ; fovea elongate or ovoid. Distal arm of sternum IX of medium length and with short setae only. Aedeagus with conspicuous dorso-posterior extension (except in *bacopus*) ; dorso-apical sclerite long or very long ; hamulus large and well defined ; lateral wall with a ventral sclerotization ; aedeagal apodeme straight and rather narrow.

Female. Posterior margin of sternum VII with a dorsal and a ventral lobe or with only a sinuate dorsal lobe. Anterior to spiracular fossa of tergum VIII 2–6 small setae. Posterior margin of tergum VIII sinuate. Tergum VIII anteriorly without an unciform sclerotization. Ventro-posterior setae of tergum VIII marginal. Sternum VIII narrow, with a pointed apex, sclerotized over whole of its length. Ductus bursae shorter than dorsal pronotal spines. Hilla of spermatheca shorter than bulga except in *bacopus* and *allisoni* in which the two are of subequal length.

Distribution. SOUTHERN and EASTERN AFRICA.

Hosts. Murid rodents.

allisoni Smit, 1962, *Rev. Zool. Bot. afr.* 66 : 200, figs. 9–12. Ethiopia.

ansorgei ansorgei Rothschild, 1907, *Novit. zool.* 14 : 330, fig. 4 (not fig. 2). Angola, S.W. Congo, Nyasaland.

ansorgei catanganus Jordan, 1936, *Novit. zool.* 39 : 295, fig. 52. Congo (Katanga, Maniema).

bacopus Jordan, 1933, *Novit. zool.* 38 : 350, figs. 69, 71. Uganda, Congo, Central African Republic.

calceatus calceatus Waterston, 1912, *Ent. mon. Mag.* 48 : 27, 1 fig. South-eastern Africa.

calceatus cabirus Jordan & Rothschild, 1913, *Novit. zool.* 20 : 549, figs. 20, 21 Eastern Africa.

natalensis Marcus & de Meillon, 1960, *Novos Taxa ent.* 22 : 6, pl. 2 figs. 1–4. Natal.

eumeces-group

Head. Area communis present in both sexes. Eye apparently more or less vestigial in *stenurus*, but well developed and dark in the other species of this group. First genal spine shorter and narrower than second ; ratio of spines ♂ 1 : 1·3 : 1·7, ♀ 1 : 1·3 : 1·6. Labial palp not reaching beyond two-thirds length of fore coxa ; without a curved apical seta. Anterior occipital row with 2–4 setae, middle row with 3–4 setae.

Thorax. Pronotum dorsally as long as or shorter than pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Normal arrangement of mesonotal pseudosetae. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa complete. Longest apical seta of second hind tarsal segment not quite reaching or reaching a little beyond apex of third segment. Fifth hind tarsal segment with four (occasionally three) pairs of lateral plantar setae.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped. One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 118, 119, 176–178). Tergum VIII with 2–6 setae anterior to spiracular fossa. Sternum VIII normal, with upper part of posterior margin finely serrated. Apodeme of tergum IX with an area fusoria. Corpus of clasper with a triangular or elongate internal ventral sclerotization. Fixed process entire or only lower lobe differentiated, the latter without a small dorso-apical seta ; the process with 4–6 large setae and one acetabular seta which is not separated by a wide gap from the other large setae. Movable process long and narrow (except in *nyikensis*) and often angular ; with 5–11 sensilla along anterior margin; 3–5 tetrad setae situated well below dorso-posterior angle ; fovea circular or elongate ; with or without a small circular sclerotization above tetrad setae ; dorso-posterior angle of movable process little or well sclerotized. Distal arm of sternum IX as long as proximal arm or nearly so, with several of its setae fairly long. Lateral wall of aedeagus forming dorso-posteriorly a usually pointed process ; dorso-apical sclerite very slender ; no ventro-basal sclerotization ; aedeagal apodeme narrow.

Female. Posterior margin of sternum VII with a sinuate dorso-lateral lobe. Anterior to spiracular fossa of tergum VIII 0–2 (occasionally three) setae ; posterior margin of tergum VIII forming a dorsal lobe ; tergum VIII anteriorly with or without an unciform sclerotization ; apical setae of preventral row marginal. Sternum VIII long and narrow, its posterior half well sclerotized. Ductus bursae not strongly sclerotized and shorter than dorsal pronotal spines. Hilla of spermatheca about as long as, or a little longer than, the bulga.

Distribution. EAST AFRICA.

Hosts. Murid rodents.

blandulus Smit, 1960, *Ann. Mus. Congo, Zool.* 88 : 359, figs. 25–28. Tanganyika.

eumeces Jordan & Rothschild, 1913, *Novit. zool.* 20 : 548, fig. 19. Eastern Congo, Uganda, Kenya.

flagellatus Smit, 1963, *Rev. Zool. Bot. afr.* 67 (in press). Nyasaland.

nyikensis Smit, 1962, *Rev. Zool. Bot. afr.* 66 : 197, figs. 6–8. Nyasaland.

stenurus Jordan, 1937, *Novit. zool.* 40 : 329, fig. 101. Kenya.

verutus Smit, 1960, *Ann. Mus. Congo, Zool.* 88 : 362, figs. 29, 30. Tanganyika.

eximius-group

Head. Area communis present in both sexes. Eye fairly well-developed. First genal spine narrower and a little shorter than second ; ratio of spine ♂ 1 : 1·2 : 1·5, ♀ 1 : 1·2 : 1·6. Labial palp reaching to two thirds length of fore coxa ; without a curved apical seta. Anterior occipital row with two setae, middle row with three.

Thorax. Pronotum dorsally considerably shorter than pronotal spines. Pronotal ctenidium with 16 spines in both sexes. Normal arrangement of mesonotal pseudosetae. About half-a-dozen setae on metepimeron.

Legs. Sulcus of mid coxa completely interrupted. Longest apical seta of second hind tarsal segment reaching to about apex of third segment or a little beyond. Fifth hind tarsal segment with three pairs of lateral plantar setae.

Abdomen. Spiracular fossae of metepimeron and terga II–VII conical, that of tergum VIII Y-shaped. One seta (the lowest) of tergal main rows below level of tergal spiracular fossae. Basal sternum without lateral setae.

Male (Figs. 120, 181). Tergum VIII with 3–4 setae anterior to spiracular fossa. Sternum VIII triangular, with a straight and finely serrate posterior margin. Apodeme of tergum IX with a small area fusoria. Corpus of clasper with a very small horizontal internal ventral incrassation. Fixed process with at most a shallow sinus, with two very strong setae apart from the more slender acetabular seta. Movable process elongate and widest apically ; with about half-a-dozen thin sensilla along dorso-anterior angle ; with only two tetrad setae, placed a short distance below the well sclerotized dorso-posterior angle ; fovea absent. Distal arm of sternum IX rather short, with one strong and several shorter setae. Aedeagus not strongly modified ; lateral wall posteriorly rounded ; dorso-apical sclerite narrow ; hamulus narrow and distinct ; no ventro-basal sclerotization; aedeagal apodeme fairly narrow.

Female (Fig. 206). Tergum VII normally with 4 (occasionally 3 or 5) stout antesensilial setae each side. Posterior margin of sternum VII with a long sinuate lateral lobe. Anterior to spiracular fossa of tergum VIII 2–3 small setae. Posterior margin of tergum VIII without a sinus ; tergum VIII anteriorly with an unciform sclerotization ; none of the setae of tergum VIII marginal. Sternum VIII short and fairly narrow, not strongly sclerotized. Ductus bursae a little shorter or about as long as dorsal pronotal spines. Hilla of spermatheca shorter than bulga.

Distribution. EAST AFRICA.

Hosts. Murid rodents.

eximius Jordan & Rothschild, 1913, *Novit. zool.* 20 : 558, figs. 29, 30. Eastern Congo, Uganda, Kenya, Tanganyika, Nyasaland.

UNGROUPABLE ETHIOPIAN SPECIES

I have been unable, for the time being, to group the Ethiopian species listed below. Segment IX of the male and the phallosome are figured.

arcanus Smit, 1960, *Tijdschr. Ent.* 103 : 283, figs. 12–14. Angola. (Figs. 122, 183.)

cophurus Jordan & Rothschild, 1913, *Novit. zool.* 20 : 556, figs. 27, 28. East Africa. (Figs. 121, 182.)

debrauwerei Berteaux, 1949, *Rev. Zool. Bot. afr.* 41 : 345, figs. 4, 5. Congo. (Figs. 124, 188.)

devignati Jordan, 1941, *Proc. R. ent. Soc. Lond.* (B) 10 : 43, fig. 1. Congo. (Figs. 125, 190.)

engis Rothschild, 1907, *Ent. mon. Mag.* 43 : 176, pl. 3, fig. 3. Ethiopia.

luberensis Berteaux, 1949, *Rev. Zool. Bot. afr.* 41 : 346, figs. 6, 7. Congo. (Figs. 129, 185.)

olbius Jordan & Rothschild, 1923, *Ectoparasites* 1 : 306, figs. 306, 307. Kenya.

phyris Jordan, 1941, *Proc. R. ent. Soc. Lond.* (B) 10 : 45, figs. 2, 3. Congo. (Figs. 126, 184.)

singularis Jordan, 1936, *Novit. zool.* 39 : 302, figs. 64–66. Uganda. (Figs. 123, 186.)

smithersi De Meillon, 1950, *J. ent. Soc. sthrn. Afr.* 13 : 35, figs. 1a, b, c. S. Rhodesia. (Figs. 128, 189.)

vanhoofi Berteaux, 1947, *Rev. Zool. Bot. afr.* 40 : 97, figs. 2, 3. Congo. (Figs. 127, 187.)

LIST OF SYNONYMS AND OTHER NOMENCLATURAL CHANGES

adetus Jordan & Rothschild, 1920, *Ectoparasites* 1 : 106, fig. 96 = *bisoctodentatus bisoctodentatus* Kolenati, 1863. **Syn. nov.**

agyrtes bosnicus Wagner, 1930, *Acta ent. Soc. jugoslav.* 3–4 : 40, fig. 5 = *agyrtes serbicus* Wagner, 1930. **Syn. nov.**

agyrtes carnicus Rosický & Carnelutti, 1959, *Čsl. Parasitol.* 6 : 137, figs. 2, 3A, 6D = *agyrtes wagnerianus* Peus, 1950. **Syn. nov.**

agyrtes celticus Jordan & Rothschild, 1922, *Ectoparasites* 1 : 282 = *nobilis nobilis* (Rothschild, 1898) (see Thompson, 1935, *Ent. mon. Mag.* 71 : 257).

agyrtes hadzii Rosický & Carnelutti, 1959, *Čsl. Parasitol.* 6 : 140, figs. 3B, 3C, 4, 5, 6A–C = *agyrtes serbicus* Wagner, 1930. **Syn. nov.**

agyrtes hanzaki Rosický, 1950, *Prirodov. Sb.* 5 : 163, fig. 4 = *agyrtes agyrtes* (Heller, 1896). **Syn. nov.**

agyrtes jiroveci Rosický, 1955, *Zool. ent. Listy* 4 : 367, figs. 1B, C = *agyrtes peusianus* Rosický, 1955. **Syn. nov.**

agyrtes jordanianus Peus, 1950, *Syllegomena biol., Festschr. Kleinschmidt* : 292, fig. 3D = *agyrtes graecus* Jordan, 1926. **Syn. nov.**

agyrtes kraljevensis Wagner, 1930, *Acta Soc. ent. jugoslav.* 3–4 : 39, fig. 4 = *agyrtes serbicus* Wagner, 1930. **Syn. nov.**

agyrtes noster Ioff, 1953, *Med. Parazitol., Moskva* 22 : 462 = *agyrtes kleinschmidtianus* Peus, 1950. **Syn. nov.**

agyrtes obenbergeri Rosický, 1957, *Čsl. Parasitol.* 4 : 294, figs. 1, 2 = *agyrtes peusianus* Rosický, 1954. **Syn. nov.**

agyrtes oreadis Jordan & Rothschild, 1920, *Ectoparasites* 1 : 104, figs. 90–93 = *agyrtes verbanus* Jordan & Rothschild, 1920. **Syn. nov.**

agyrtes slovacicus Rosický, 1950, *Prirodov. Sb.* 5 : 163, figs. 1–3 = *agyrtes agyrtes* ⇌ *agyrtes peusianus*. **Syn. nov.**

agyrtoides Wahlgren, 1911, *Ent. Tidskr.* 32 : 105, figs. 1, 2 = *agyrtes agyrtes* (Heller, 1896). **Syn. nov.**

bisoctodentatus occidentalis Smit, 1956, *Ent. mon. Mag.* 92 : 296 = *bisoctodentatus heselhausi* (Oudemans, 1914) (see Smit, 1962, *Tijdschr. Ent.* 105 : 56).

bisseptemdentatus Kolenati, 1863, *Horae Soc. ent. ross.* 2 : 36, pl. 2, fig. 7. **Nomen dubium.**

bogatschevi Wagner & Argyropulo, 1934—a subspecies of *congener*.

calceatus cabirus Jordan & Rothschild, 1913—**Comb. nov.** for *cabirus*.

calceatus septentrionalis de Meillon, 1940, *J. ent. Soc. sthrn Afr.* 3 : 62, figs. 1, 2 = *calceatus* [*calceatus*] Waterston, 1912 (see de Meillon, 1950, *l. c.* 13 : 35).

campestris Peus, 1949, *Z. Parasitenk.* 14 : 96, figs. 7, 8 = *assimilis* (Taschenberg, 1880). **Syn. nov.**

congener bulgaricus Rosický, 1959, *Acta Acad. Sci. czechoslov. brun.* 31 : 332, figs. 11, 12B, 12C = *congener vicarius* Jordan & Rothschild, 1921. **Syn. nov.**

congener hasegawai Ono, 1955, *Med. Biol.* 35 : 21, figs. c, d = *congeneroides truncus* Ioff & Scalon, 1950 (see Sakaguti & Jameson, 1962, *Pacif. Ins. Monogr.* 3 : 65).

congener hokkaidensis Smit, 1955, *Proc. R. ent. Soc. Lond.* (B) 24 : 73, figs. 5, 6 = *congeneroides truncus* Ioff & Scalon, 1950 (see Sakaguti & Jameson, 1962, *Pacif. Ins., Monogr.* 3 : 65).

congener honshuensis Smit, 1955, *Proc. R. ent. Soc. Lond.* (B) 24 : 69, figs. 1, 2 = *congeneroides congeneroides* Wagner, 1930 (see Sakaguti & Jameson, 1962, *Pacif. Ins., Monogr.* 3 : 68).

dahuricus Ioff, 1927, *Annu. Mus. zool. Acad. St. Pétersb.* 28 : 431, figs. 14, 15 = *pisticus pisticus* Jordan & Rothschild, 1921 (see Ioff, Dubinin & Zheludkova, 1950, *Ektoparazity* 2 : 36).

evidens elgonensis Jordan, 1938—**Comb. nov.** for *modicus elgonensis*.

evidens modicus Jordan, 1933—**Comb. nov.** for *modicus modicus* [Jordan, 1938, *Novit. zool.* 41 : 114].

gigantospalacis uralospalacis Tiflov & Usov, 1939—**Comb. nov.** for *uralospalacis.*

golovi elegans Argyropulo, 1935, *Z. Azerbeid. Inst. Microbiol.* 5 : 188, fig. 67^1 = *golovi golovi* Ioff & Tiflov, 1930 (see Ioff, 1949, *Ektoparazity* 1 : 88).

hispanicus Jordan, 1938—a full species, not a subspecies of *agyrtes.*

isochaetus Wagner, 1930, *Annu. Mus. zool. Acad. St. Pétersb.* 30 : 538, fig. 8 = *calceatus cabirus* Jordan & Rothschild, 1913. **Syn. nov.**

obtusus recurvus Peus, 1951, *Veštn. Čsl. zool. spol.* 15 : 236, figs. 2, 4, 5 = *obtusus* Jordan & Rothschild, 1912. **Syn. nov.**

orientalis kratochvili Jurík, 1955, *Acta Univ. Agric. Brno* (1955) : 176, fig. 2 = *orientalis* (Wagner, 1898) (see Rosický, 1957, *Fauna ČSR* 10 : 242).

orphilus heinrichi Peus, 1949, *Z. Parasitenk.* 14 : 98, figs. 9, 10b, 11c = *orphilus dolomiticus* Jordan, 1928. **Syn. nov.**

orphilus tatricus Rosický, 1950, *Prirodov. Sb.* 5 : 164, fig. 5 = ? *agyrtes agyrtes* ⇌ *agyrtes peusianus.* **Syn. nov.**

phrator Jordan, 1929, *Novit. zool.* 35 : 180, figs. 12, 13 = *inornatus* Wagner, 1916 (see Ioff & Argyropulo, 1934, *Z. Parasitenk.* 7 : 157).

ruris karamani Wagner, 1936, *Z. Parasitenk.* 8 : 349, figs. 21, 22 = *ruris* Jordan, 1929. **Syn. nov.**

russulae ducis Jordan, 1929, *Novit. zool.* 35 : 41, fig. 3 = *russulae* Jordan & Rothschild, 1912. **Syn. nov.**

saratovi Ioff & Tiflov, 1938, *Keys to fleas of S.E. U.S.S.R.*: 44, figs. 72, 126 = *golovi golovi* Ioff & Tiflov, 1930 (see Ioff, 1949, *Ektoparazity* 1 : 88).

segregus Jordan, 1937, *Novit. zool.* 40 : 332, figs. 107, 108 = *bacopus* Jordan, 1933. **Syn. nov.**

[*orphilus*] *sklavinus* Wagner, 1933, *Konowia* 11 : 278, fig. 4 = *orphilus dolomiticus* Jordan, 1928. **Syn. nov.**

typhlus Victor [Motschulsky], 1840, *Bull. Soc. imp. Nat. Moscou* (1840) : 169, pl. 4, figs. a, A. **Nomen dubium.**

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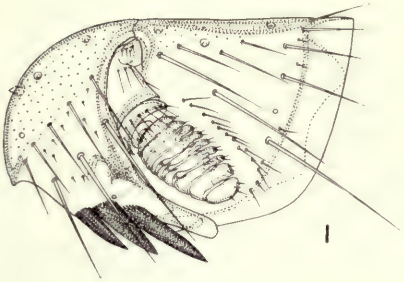
ENTO. 14, 3. 4.

PLATE 1

Figs. 1–10. Head, ♂, of (1) *Ctenophthalmus nobilis nobilis* (Rothschild) (nr. Worthing, England) ; (4) *C. spalacis* Jordan & Rothschild (nr. Saratov, U.S.S.R.). Head and pronotum, ♂, of (2) *C. dolomydis* Smit (holotype) ; (3) *C. rettigi* Rothschild (Dobrogea, Romania). Genal ctenidium of (5) *C. dolomydis* Smit, ♀ (allotype) ; (6) *C. nifetodes martinorum* Smit, ♀ (paratype) ; (7, 8) *C. assimilis* (Taschenberg) ♂♀ resp. (Purgstall, Austria) ; (9, 10) *C. gratus gratus* Jordan & Rothschild, ♂♀ resp. (Kolchikon, Greece).



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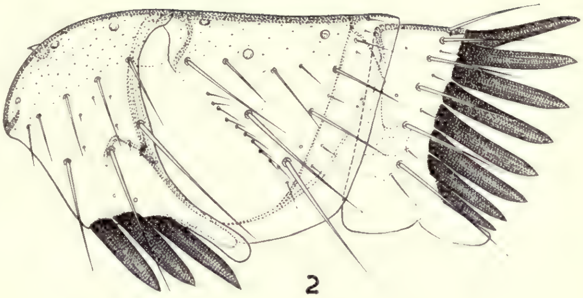

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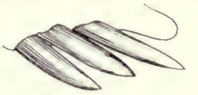

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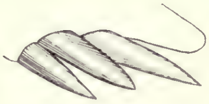

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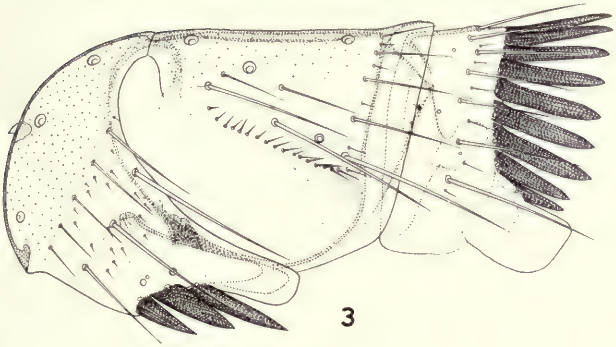

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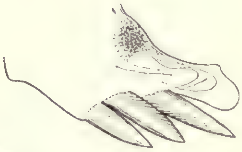

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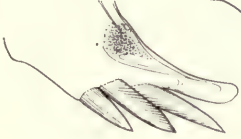

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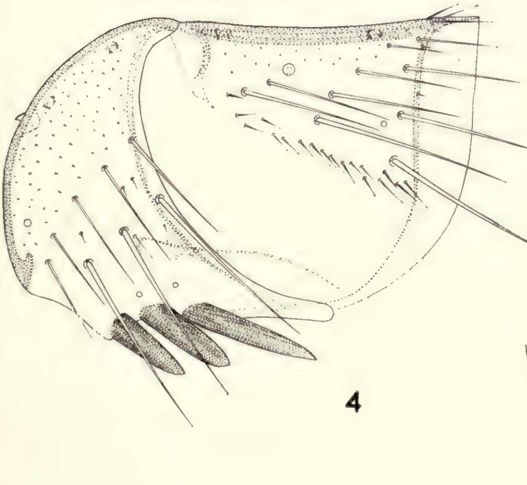

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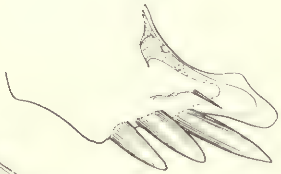

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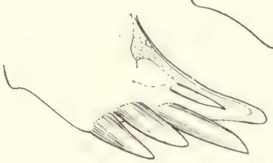

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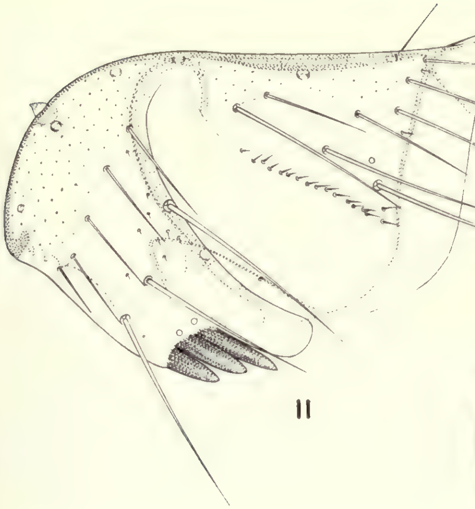
PLATE 2

FIGS. 11–19. Head, ♂, of (11) *Ctenophthalmus dilatatus* Wagner (Tarbagatai Mts., E. Kazakhstan) ; (12) *C. tertius* Smit (holotype) ; (13) *C. edwardsi* Jordan (Mt. Elgon, Kenya). Genal ctenidium of (14, 15) *C. parcus* Jordan ♂♀ (paratypes) ; (16, 17) *C. dolichus dolichus* Rothschild ♂ (paratype), ♀ (Panfilovsky rayon, E. Kazakhstan). *C. particularis* Berteaux (18) head and pronotum, ♂ (holotype) ; (19) pronotum, ♀ (allotype).



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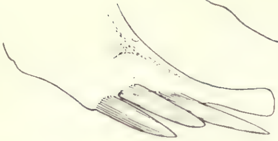

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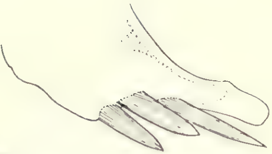

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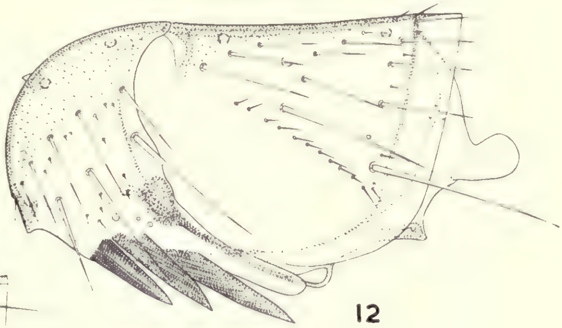

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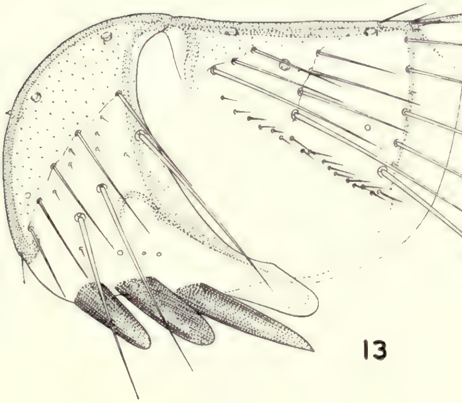

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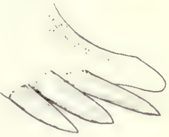

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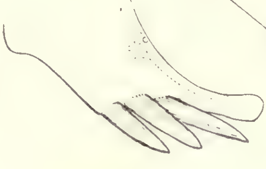

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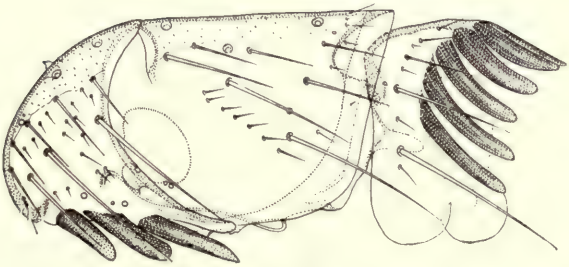

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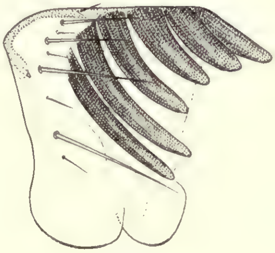

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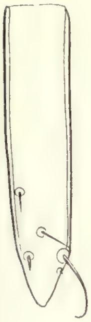
PLATE 3

Figs. 20–31. Apical segment of labial palp, ♂, of (20) *Ctenophthalmus agyrtes agyrtes* (Heller) (nr. Sepolno, Poland) ; (21) *C. orphilus orphilus* Jordan & Rothschild (nr. Alpiglen, B.–O., Switzerland) ; (22) *C. uncinatus* (Wagner) (Abisco, Sweden) ; (23) *C. gratus gratus* Jordan & Rothschild (Romania) ; (24) *C. spalacis* Jordan & Rothschild (Romania) ; (25) *C. turcicus* Jordan (District of Ankara, Turkey) ; (26) *C. inornatus* Wagner (Caucasus) ; (27) *C. eumeces* Jordan & Rothschild (Kerugoya, Kenya) ; (28) *C. acunus* Jordan (holotype). Mid coxa of (29) *C. agyrtes provincialis* Rothschild ♂ (Montroc, France) ; (30) *C. nivalis nivalis* Rothschild ♀ (Bonnenuit, France) ; (31) *C. rettigi* Rothschild ♂ (Dobrogea, Romania).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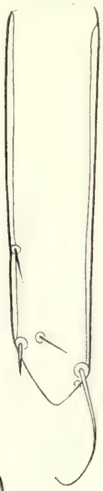
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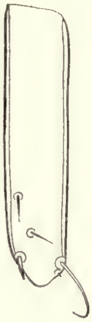
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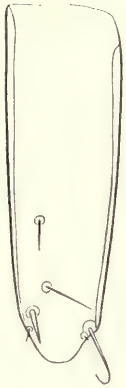
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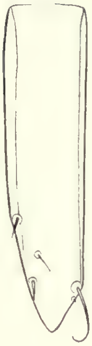
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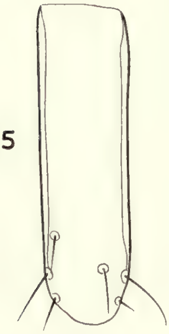
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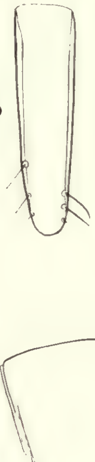
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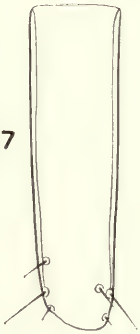
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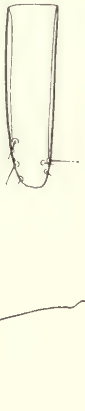
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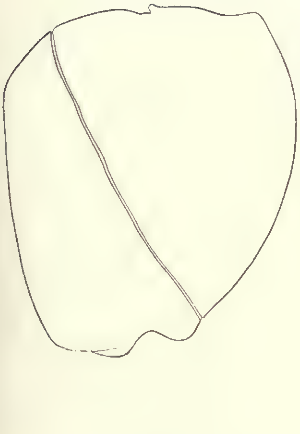
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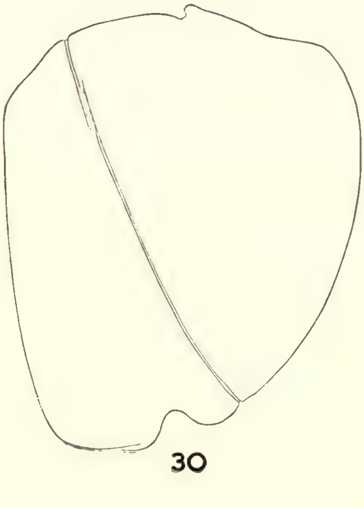
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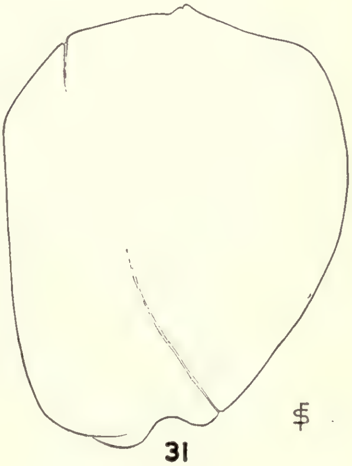
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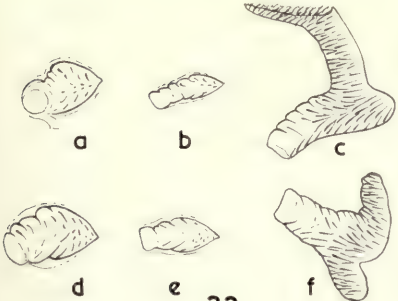
PLATE 4

Figs. 32–37. Spiracular fossae of metepimeron (a, d), terga VII (b, e) and VIII (c, f) of ♂ (a–c) and ♀ (d–f) of (32) *Ctenophthalmus agyrtes agyrtes* (Heller) (Robocice, Poland); (33) *C. bisoctodentatus heselhausi* (Oudemans) ♂ (Schauboden, Austria) ♀ (Rogatsboden, Austria); (34) *C. assimilis* (Taschenberg) (Purgstall, Austria); (35) *C. gratus gratus* Jordan & Rothschild (Kolchikon, Greece); (36) *C. spalacis* Jordan & Rothschild (Volodarsk, Ukraine); (37) *C. rettigi* Rothschild (paratypes).



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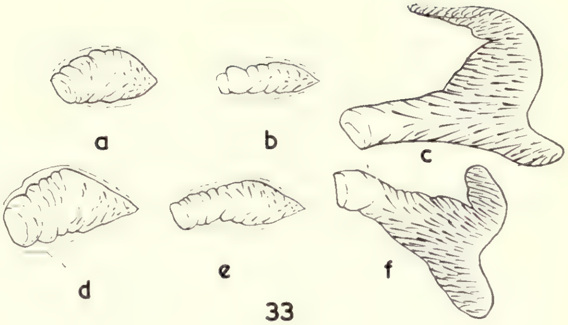

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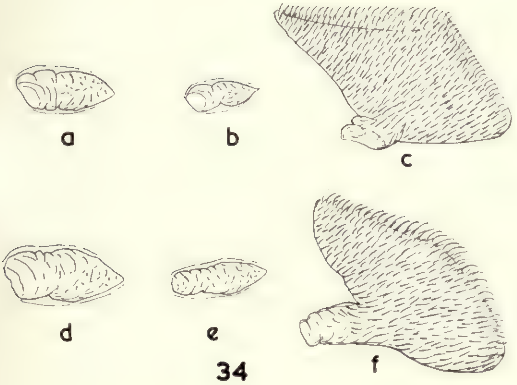

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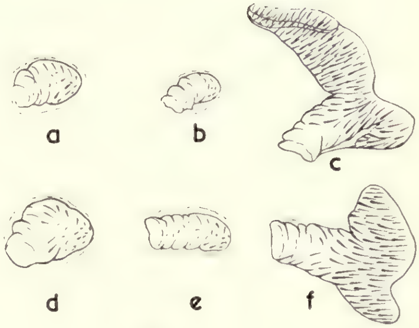

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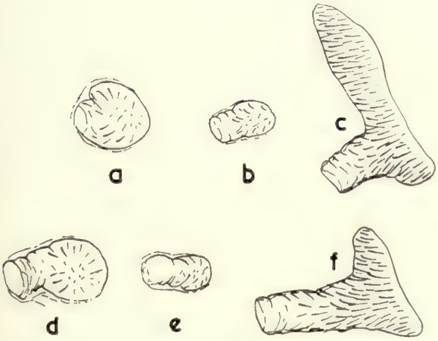

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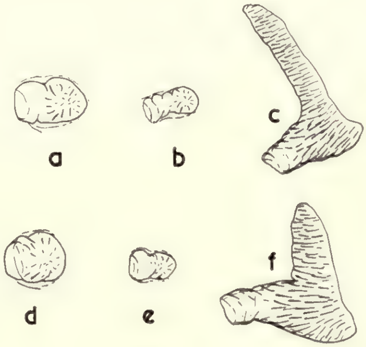

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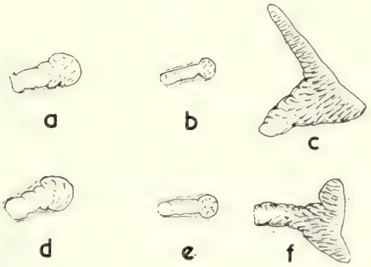
PLATE 5

FIGS. 38–45. Spiracular fossae of metepimeron (a, d), terga VII (b, e) and VIII (c, f) of ♂ (a–c) and ♀ (d–f) of (38) *Ctenophthalmus dolichus dolichus* Rothschild (paratypes) ; (39) *C. dilatatus* Wagner (Tarbagatai Mts., E. Kazakhstan) ; (40) *C. dux* Jordan & Rothschild (paratypes) ; (41) *C. edwardsi* Jordan (Kitale, Kenya). Mesonotal collar of (42) *Ctenophthalmus agyrtes agyrtes* (Heller) ♂ (Robocice, Poland) ; (43) *C. caucasicus* (Taschenberg) ♂ (Mramorák/Deliblat, Yugoslavia) ; (44) *C. dolichus dolichus* Rothschild ♂ (topotype) ; (45) *C. dilatatus* Wagner ♂ (Tarbagatai Mts., E. Kazakhstan).



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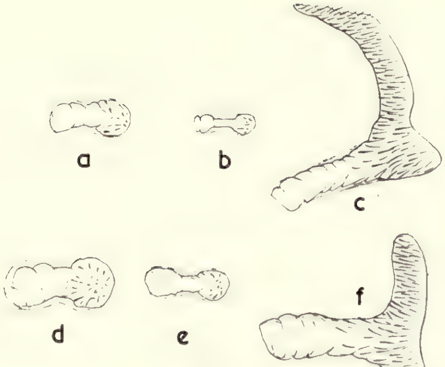

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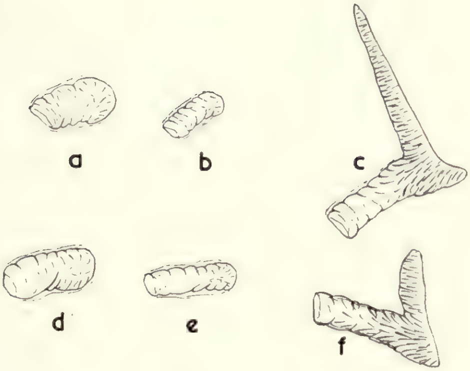

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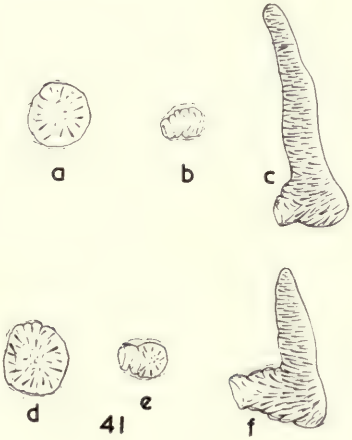

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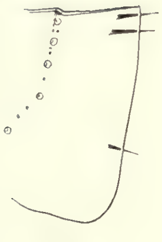

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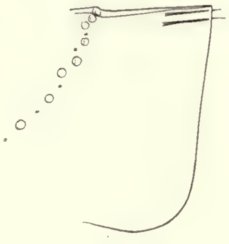

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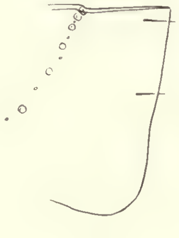

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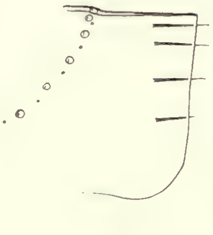

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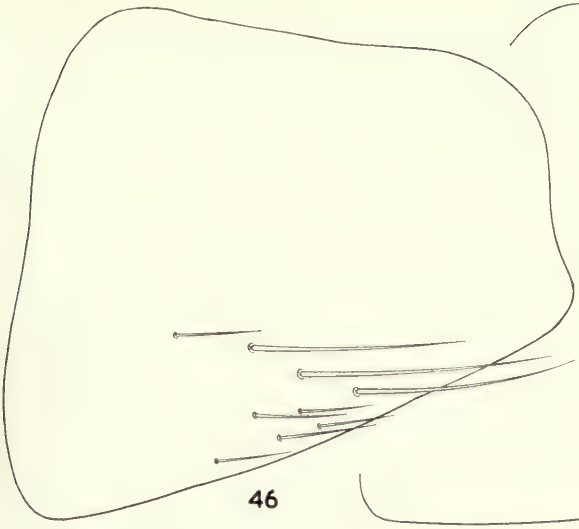
PLATE 6

Figs. 46–50. Sternum VIII, ♂, of (46) *Ctenophthalmus agyrtes agyrtes* (Heller) (Sellingen, Netherlands) ; (47) *C. arvernus* Jordan (paratype) ; (48) *C. russulae* Jordan & Rothschild (Souk-Ahras, Algeria) ; (49) *C. dolomydis* Smit (holotype) ; (50) *C. nivalis nivalis* Rothschild (Bonnenuit, France).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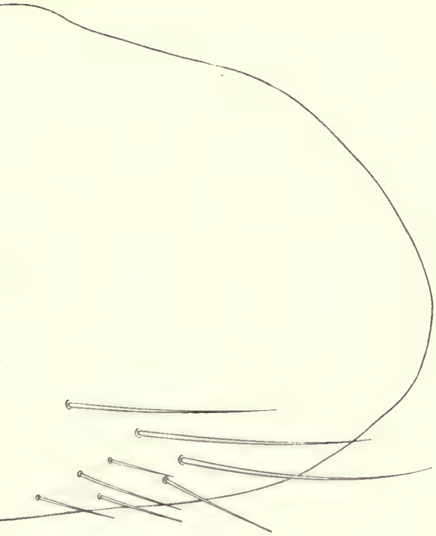
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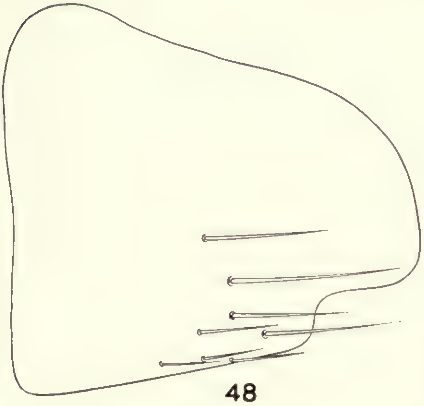
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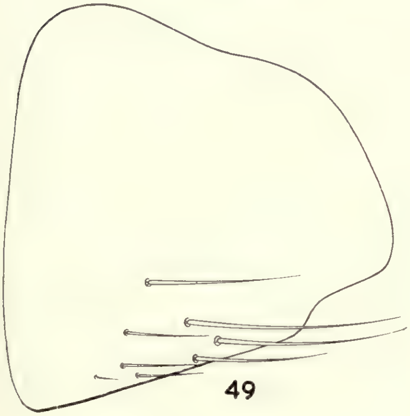
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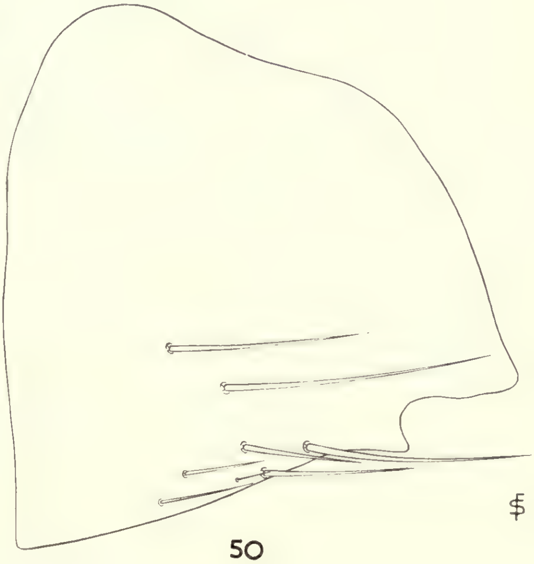
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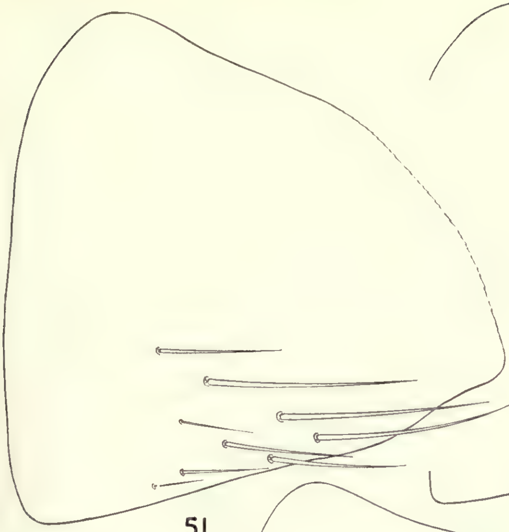
PLATE 7

Figs. 51–55. Sternum VIII, ♂, of (51) *Ctenophthalmus assimilis* (Taschenberg) (Grulich, Poland) ; (52) *C. acuminatus* Ioff & Argyropulo (topotype) ; (53) *C. pseudagyrtes pseudagyrtes* Baker (paratype) ; (54) *C. golovi golovi* Ioff & Tiflov (Baksan, N. Caucasus) ; (55) *C. dolichus dolichus* Rothschild (holotype).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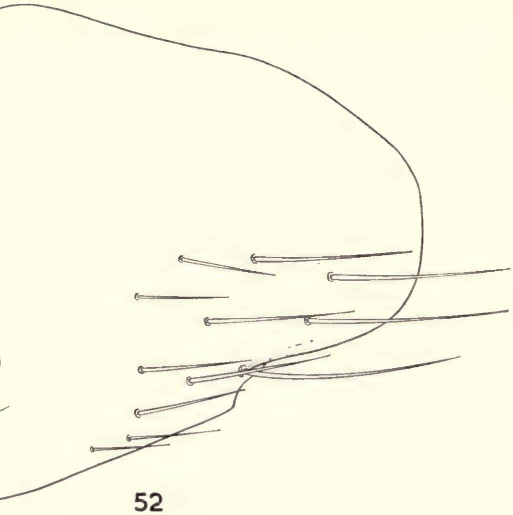
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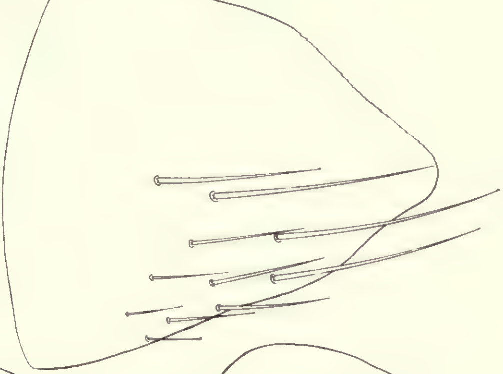
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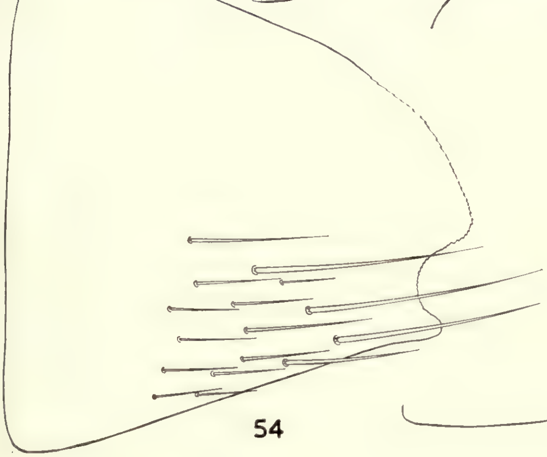
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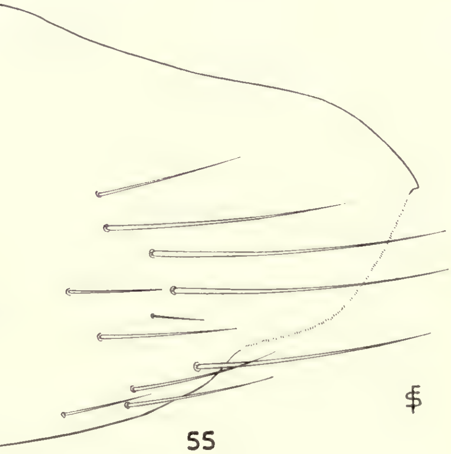
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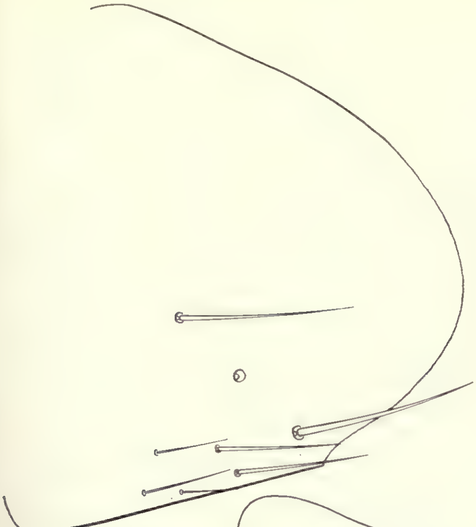
PLATE 8

Figs. 56–60. Sternum VIII, ♂, of (56) *Ctenophthalmus iranus persicus* Smit (holotype) ; (57) *C. pisticus* Jordan & Rothschild (Mondy, Buryat-Mongol'skaya, A.S.S.R.) ; (58) *C. particularis* Berteaux (holotype) ; (59) *C. calceatus cabirus* Jordan & Rothschild (holotype) ; (60) *C. ominosus* Smit (paratype).



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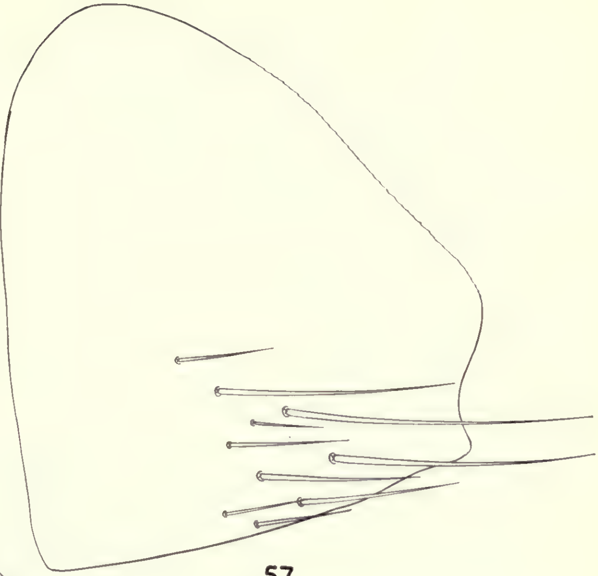

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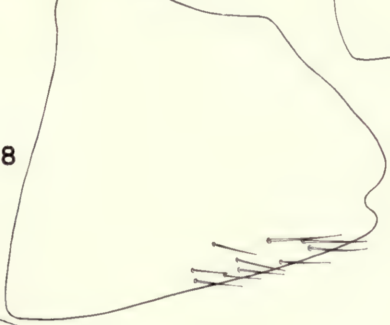

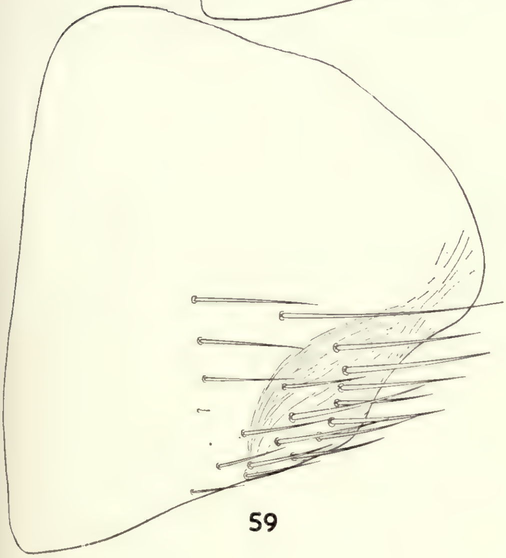

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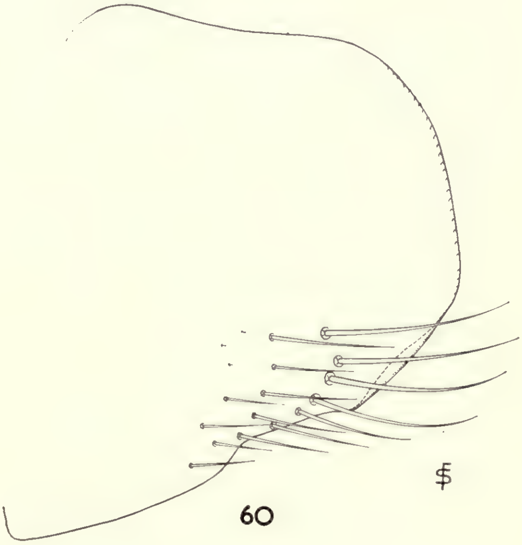

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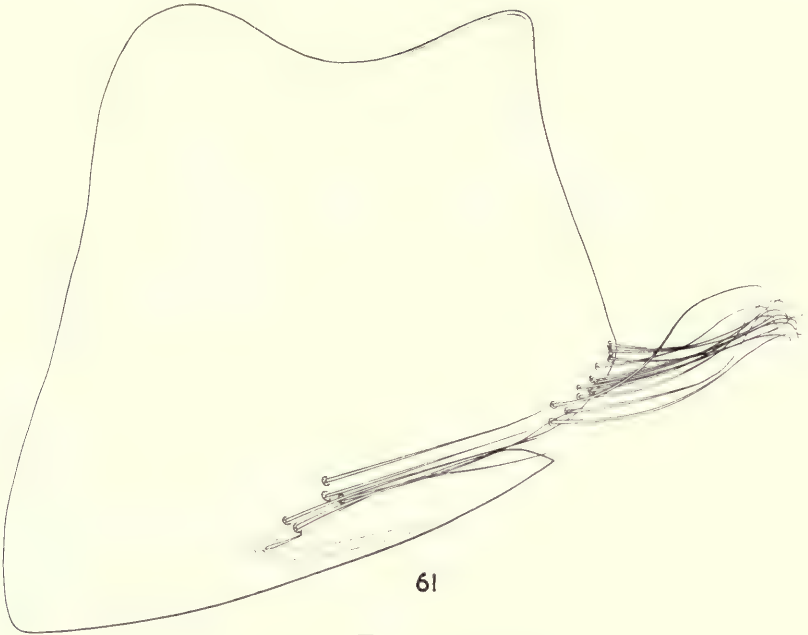
PLATE 9

FIGS. 61–63. Sternum VIII, ♂, of (61) *Ctenophthalmus dilatatus* Wagner (Tarbagatai Mts., E. Kazakhstan) ; (62) *C. capriciosus* Smit (holotype) ; (63) *C. dux* Jordan & Rothschild (holotype).



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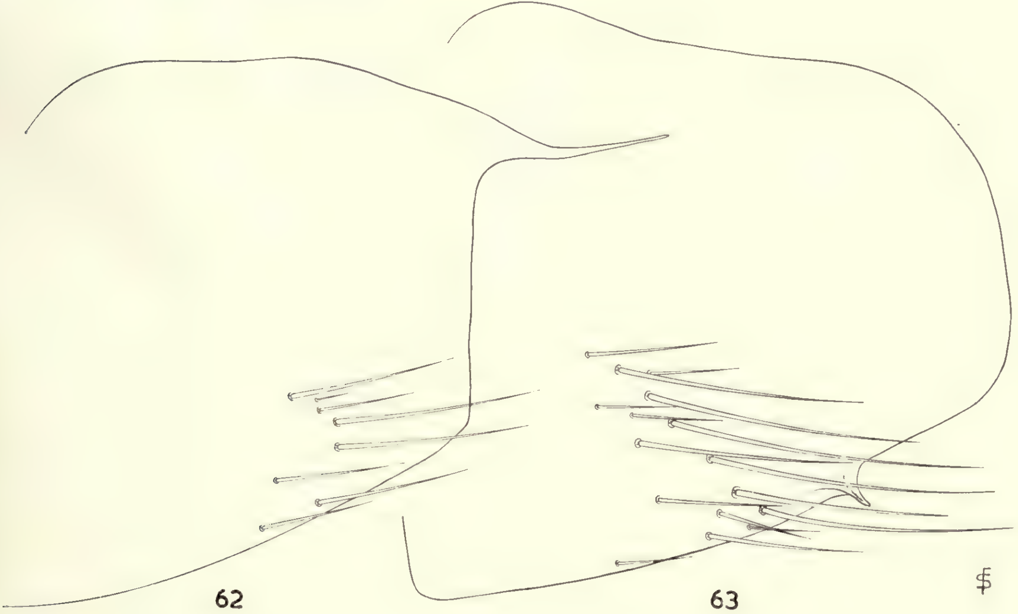

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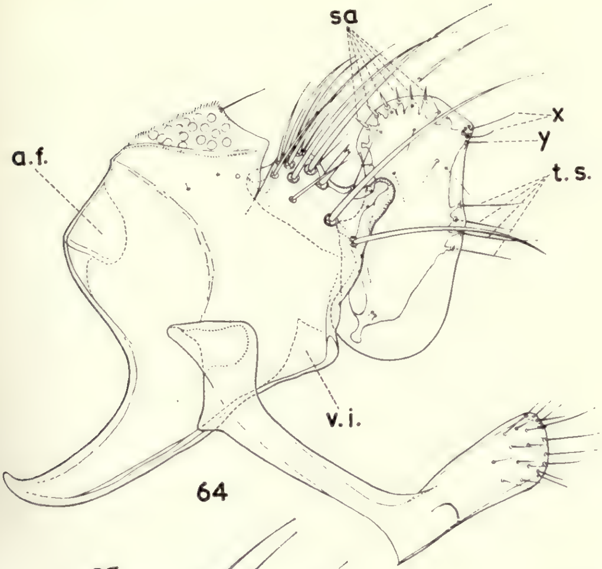
PLATE 10

FIGS. 64–69. Segment IX, ♂, of (64) *Ctenophthalmus teres* Ioff & Argyropulo (Station Nalband, Armenia). Processes of clasper of (65) *C. breviatus* Wagner & Ioff (Generalskoye, U.S.S.R.) ; (66) *C. nifetodes nifetodes* Wagner (Trebević, Yugoslavia) ; (67) *C. monticola* (Kohaut) (Kućište, nr. Péc, Yugoslavia) ; (68) *C. agyrtes smitianus* Peus (topotype). Phallosome (69) *C. congener congener* Rothschild (St. Albans, England).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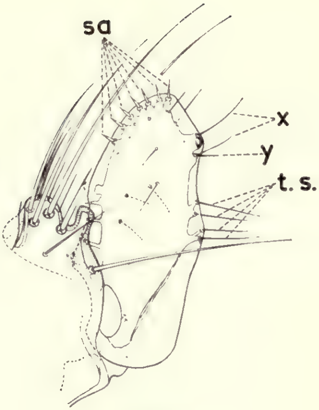

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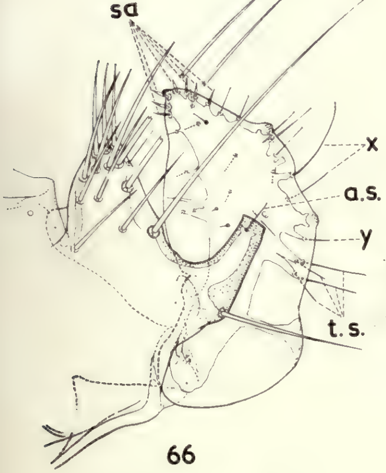

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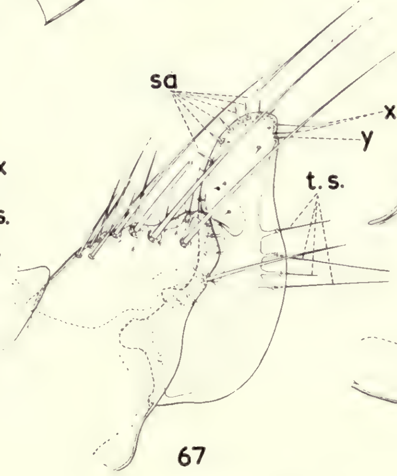

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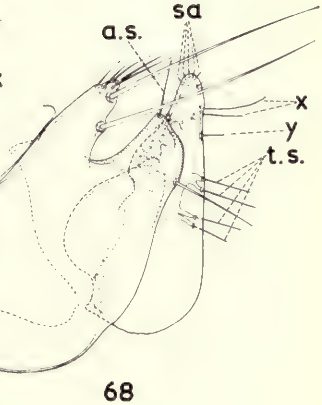

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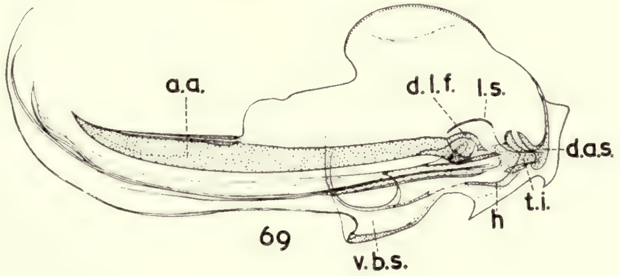
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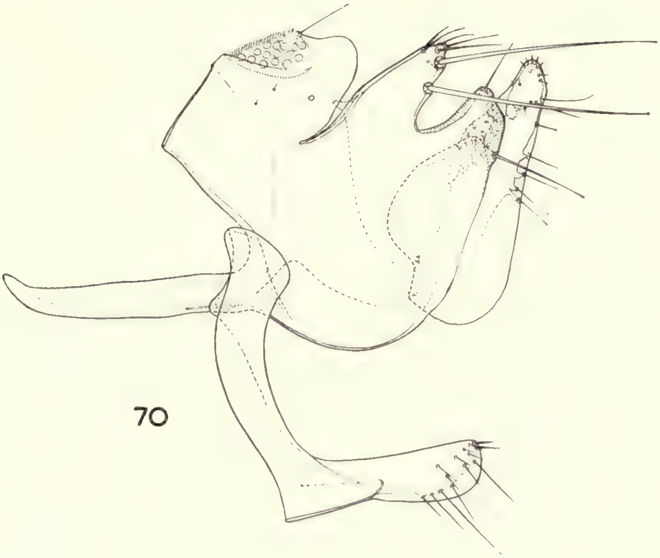
l.s.
d.a.s.
t.i.
h
v.b.s.

69

PLATE 11

FIGS. 70–71. Segment IX, ♂, of (70) *Ctenophthalmus agyrtes agyrtes* (Heller) (topotype) ; (71) *C. hispanicus* Jordan (holotype).



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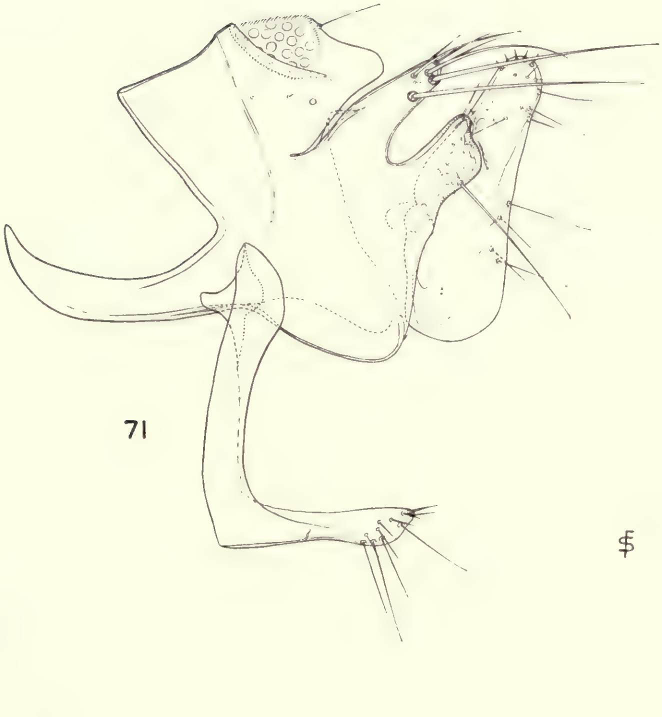

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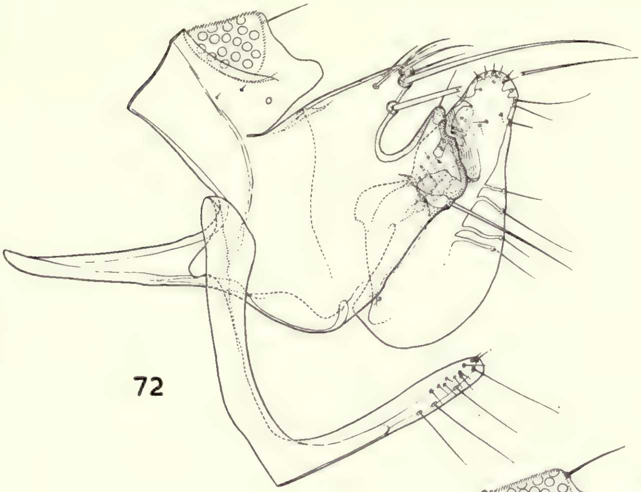
PLATE 12

FIGS. 72–74. Segment IX, ♂, of (72) *Ctenophthalmus andorrensis* Smit (holotype) ; (73) *C. bifidatus* Smit (paratype) ; (74) *C. arvernus* Jordan (paratype, Villefagnan, nr. Ruffec, France).



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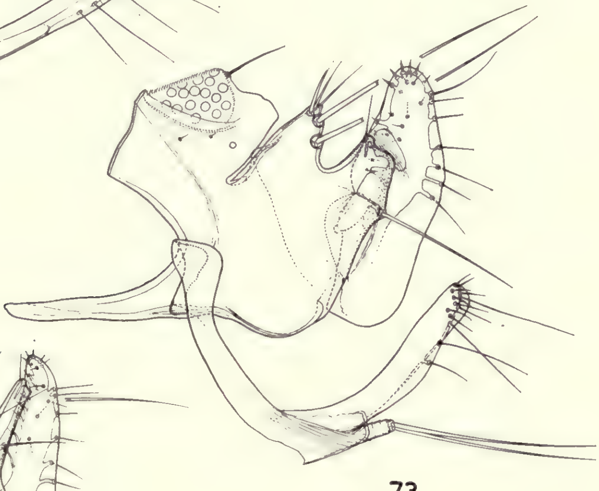

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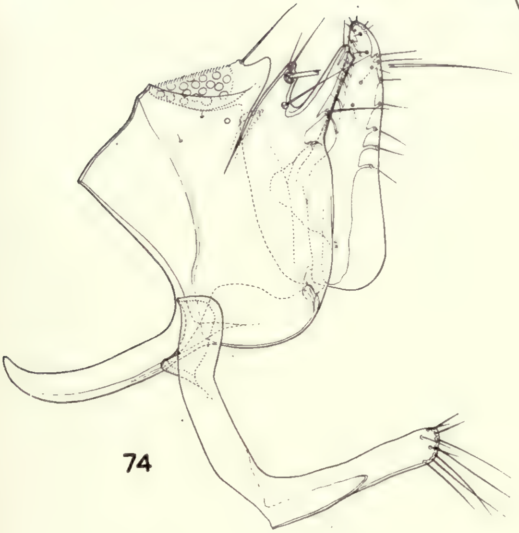

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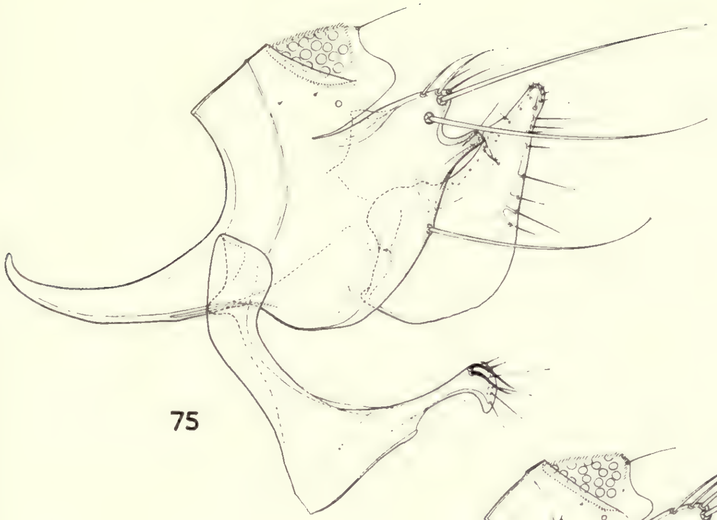
PLATE 13

FIGS. 75–77. Segment IX, ♂, of (75) *Ctenophthalmus capriciosus* Smit (holotype) ; (76) *C. proximus* (Wagner) (paratype) ; (77) *C. solutus solutus* Jordan & Rothschild (Berne, Switzerland).



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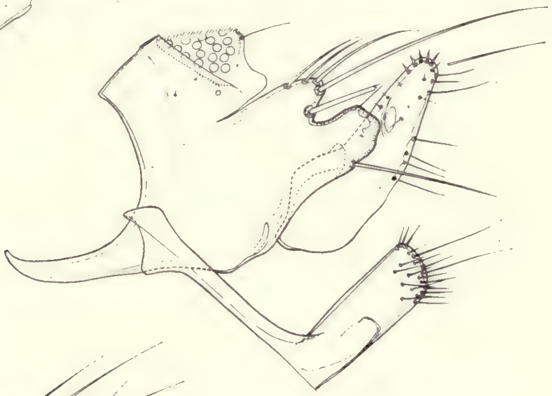

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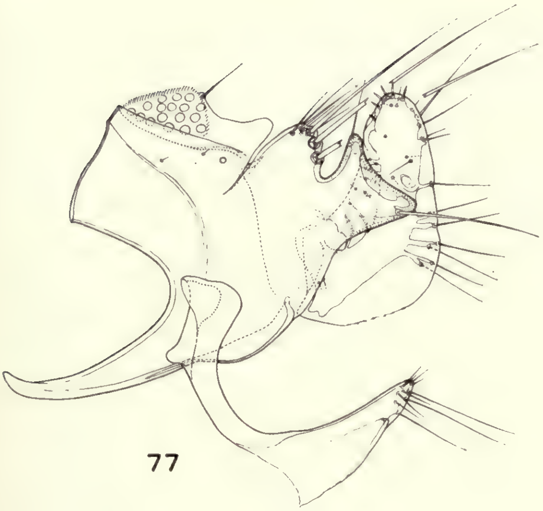

77

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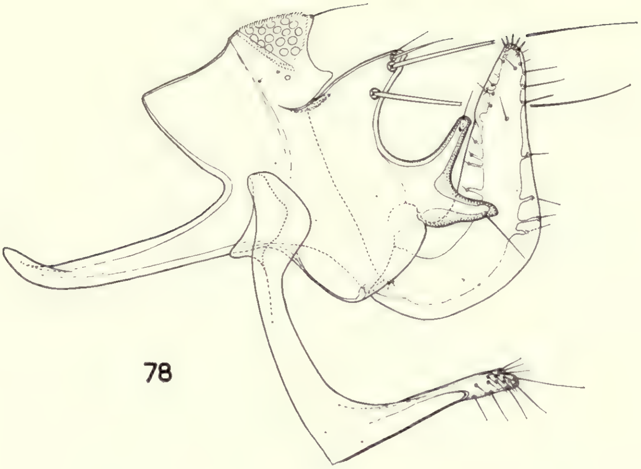
PLATE 14

Figs. 78–79. Segment IX, ♂, of (78) *Ctenophthalmus apertus apertus* Jordan & Rothschild (topotype) ; (79) *C. bisoctodentatus heselhausi* (Oudemans) (Neuss, Germany).



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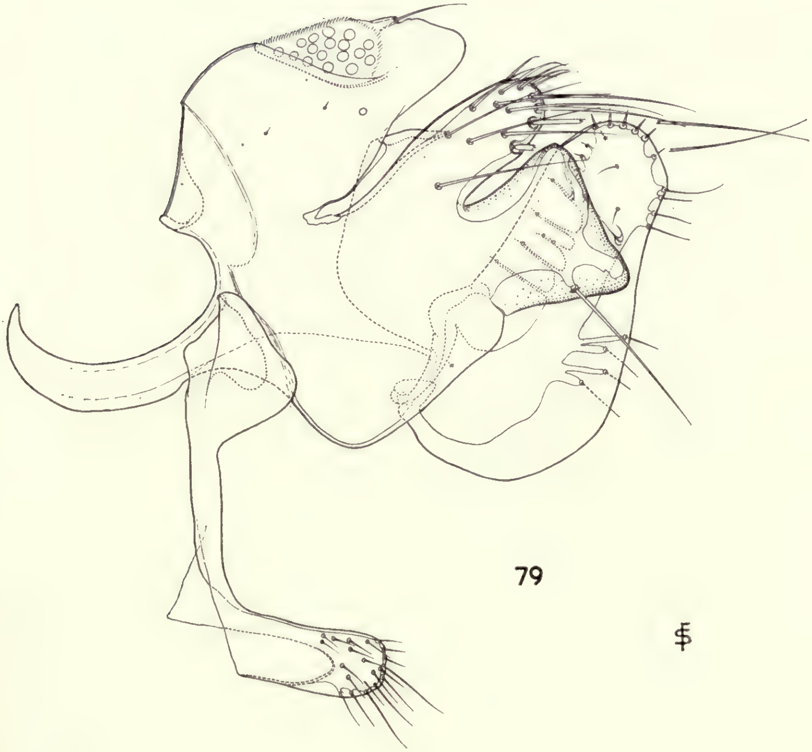

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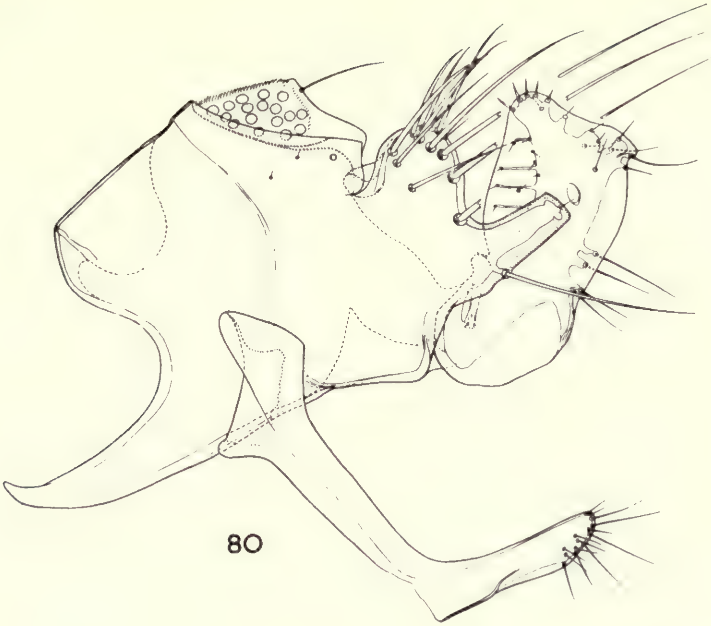
PLATE 15

FIGS. 80–81. Segment IX, ♂, of (80) *Ctenophthalmus nivalis nivalis* Rothschild (Bonnenuit, France); (81) *C. nifetodes martinorum* Smit (holotype).



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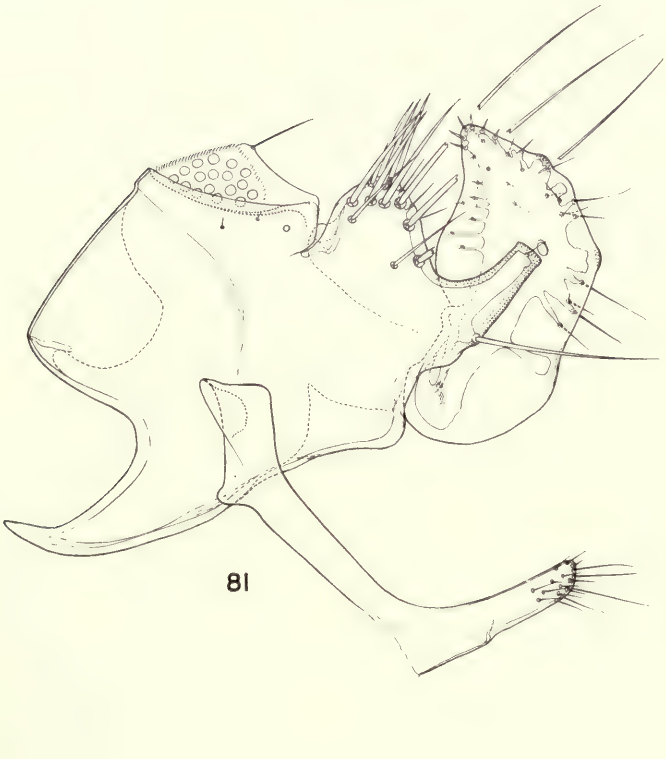

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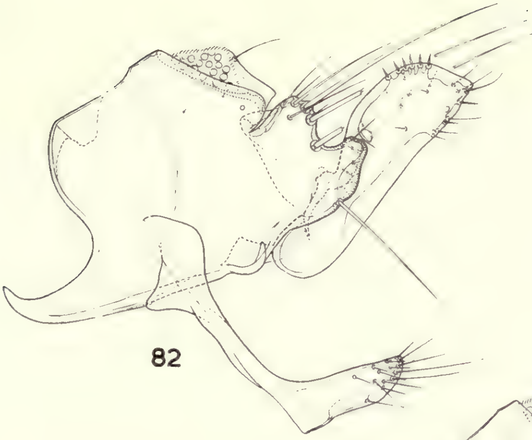
PLATE 16

Figs. 82–84. Segment IX, ♂, of : (82) *Ctenophthalmus dolomydis* Smit (holotype) ; (83) *C. russulae* Jordan & Rothschild (Souk-Ahras, Algeria) ; (84) *C. golovi golovi* Ioff & Tiflov (Baksan, North Caucasus).



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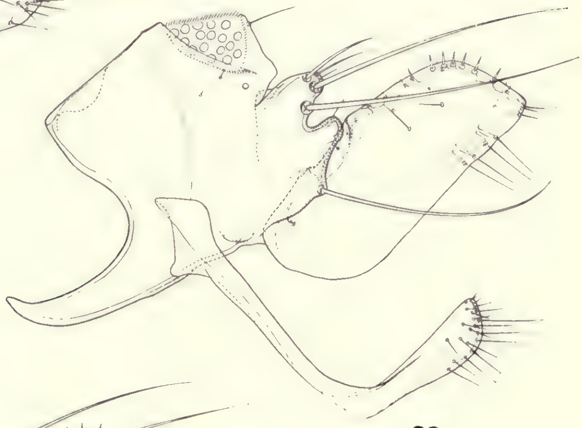

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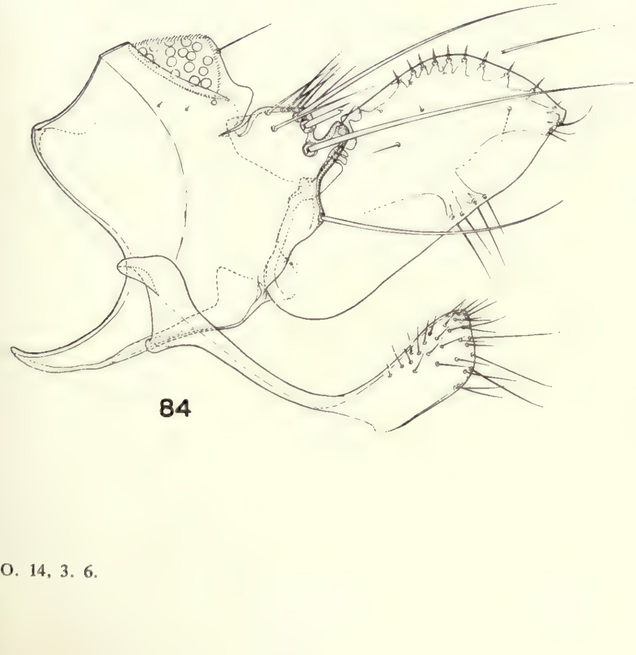

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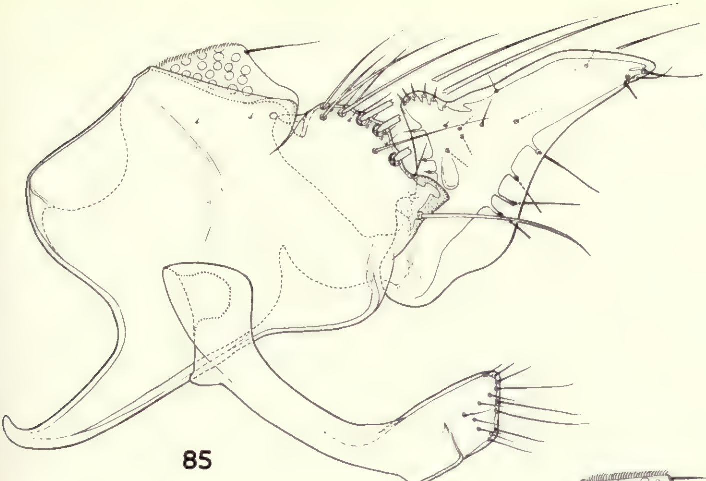
PLATE 17

FIGS. 85–87. Segment IX, ♂, of (85) *Ctenophthalmus assimilis* (Taschenberg) (Walcheren, Netherlands) ; (86) *C. congener congener* Rothschild (Pavilly, France) ; (87) *C. gratus gratus* Jordan & Rothschild (holotype).



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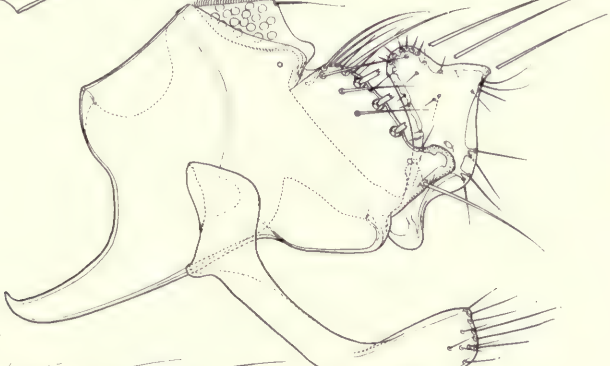

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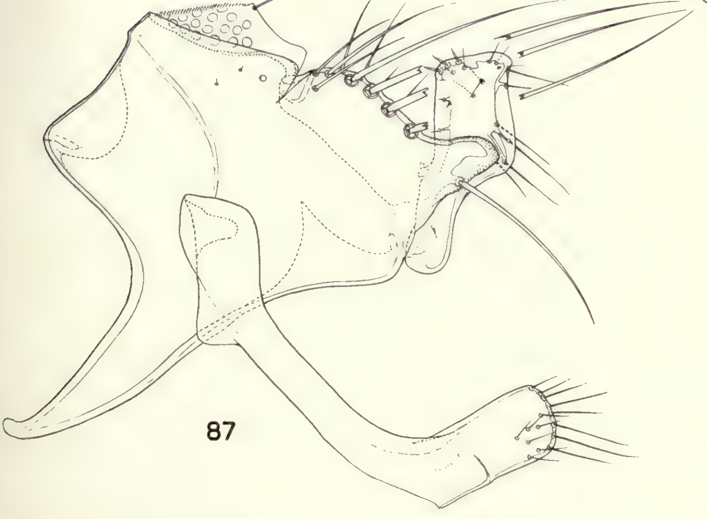

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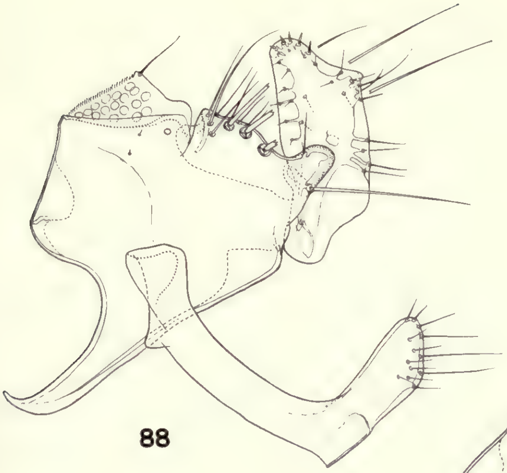
PLATE 18

Figs. 88–90. Segment IX, ♂, of (88) *Ctenophthalmus parvus* Argyropulo (Kisha, N.W. Caucasus) ; (89) *C. arvalis* Wagner & Ioff (paratype) ; (90) *C. pollex* Wagner & Ioff (paratype).



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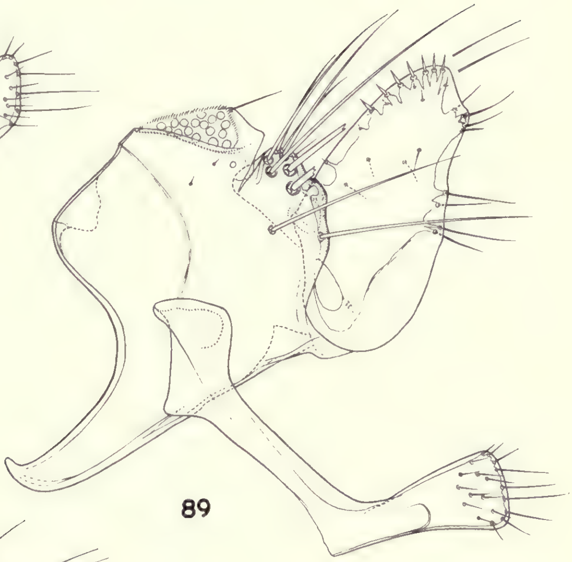

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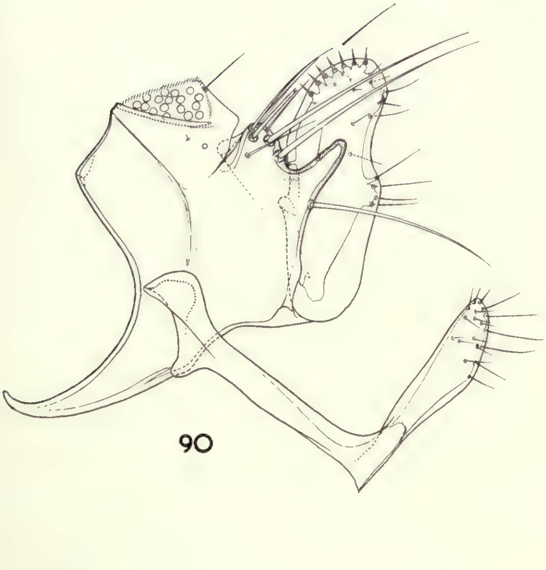

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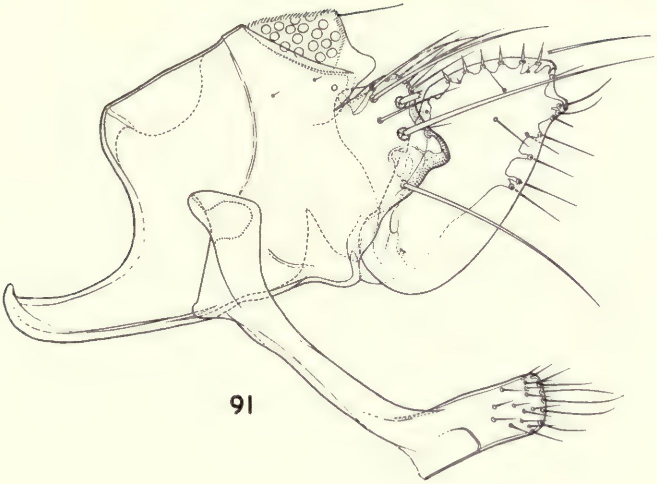
PLATE 19

FIGS. 91–92. Segment IX, ♂, of (91) *Ctenophthalmus orientalis* Wagner (Taganrog, Rostovskaya oblast, U.S.S.R.) ; (92) *C. iranus persicus* Smit (holotype).



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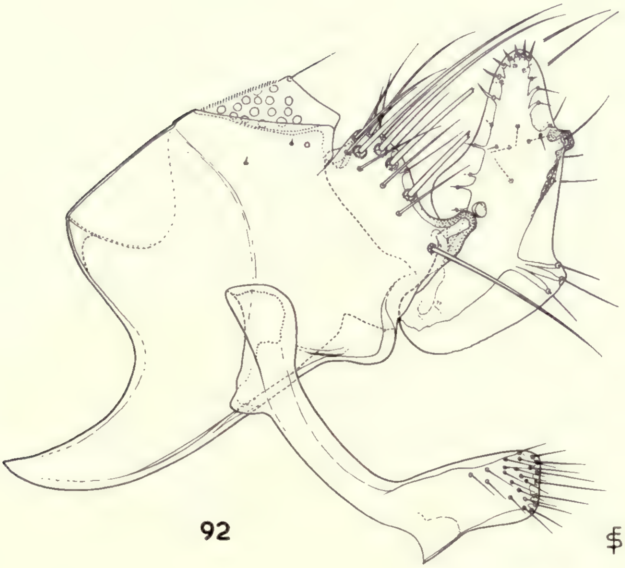

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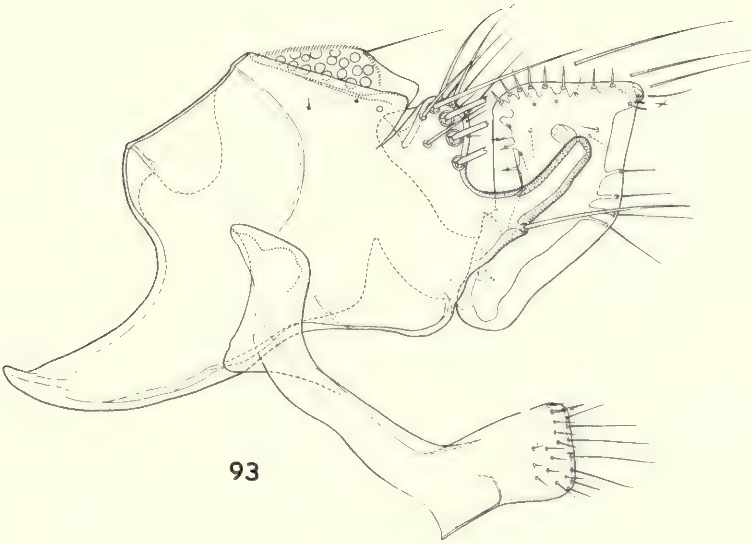
PLATE 20

Figs. 93–94. Segment IX, ♂, of (93) *Ctenophthalmus wagneri wagneri* Tiflov (N. Caucasus) ; (94) *C. pisticus pisticus* Jordan & Rothschild (Mondy, Buryat-Mongol'skaya, A.S.S.R.).



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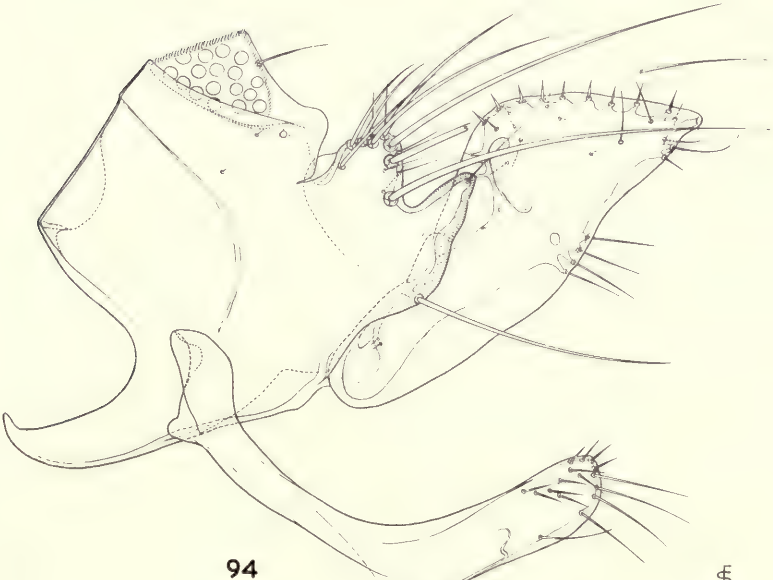
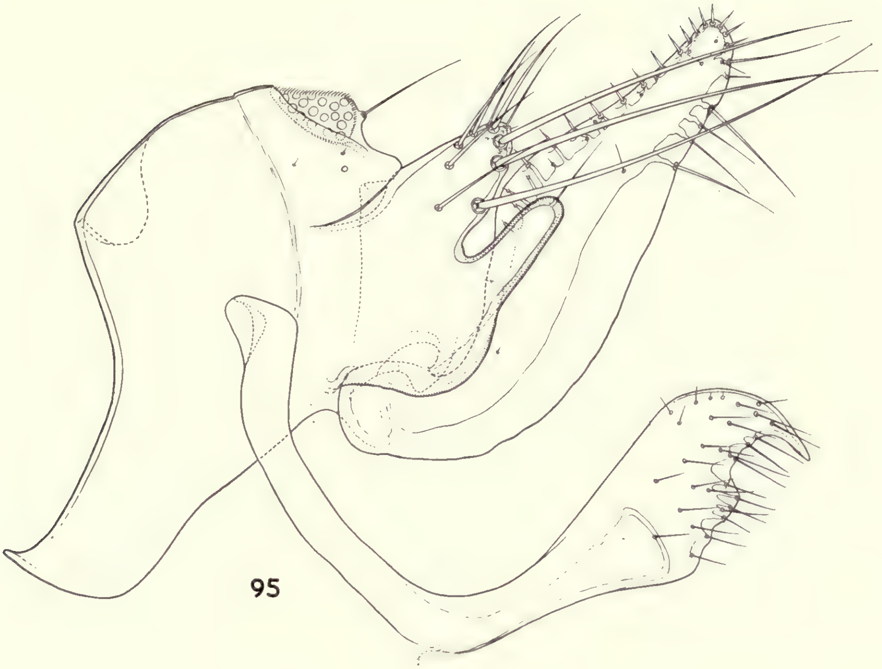


94

PLATE 21

FIGS. 95–96. Segment IX, ♂, of (95) *Ctenophthalmus dux* Jordan & Rothschild (holotype) ; (96) *C. dolichus dolichus* Rothschild (paratype).



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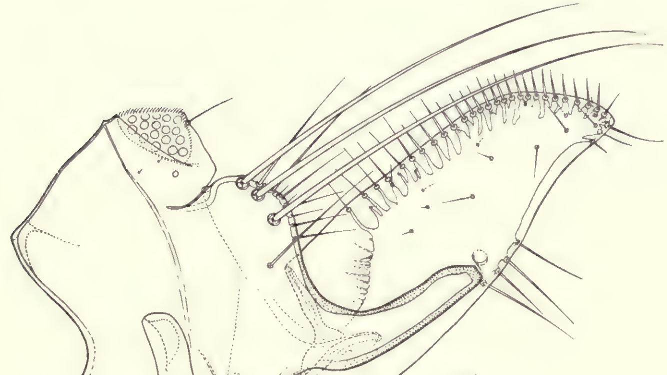
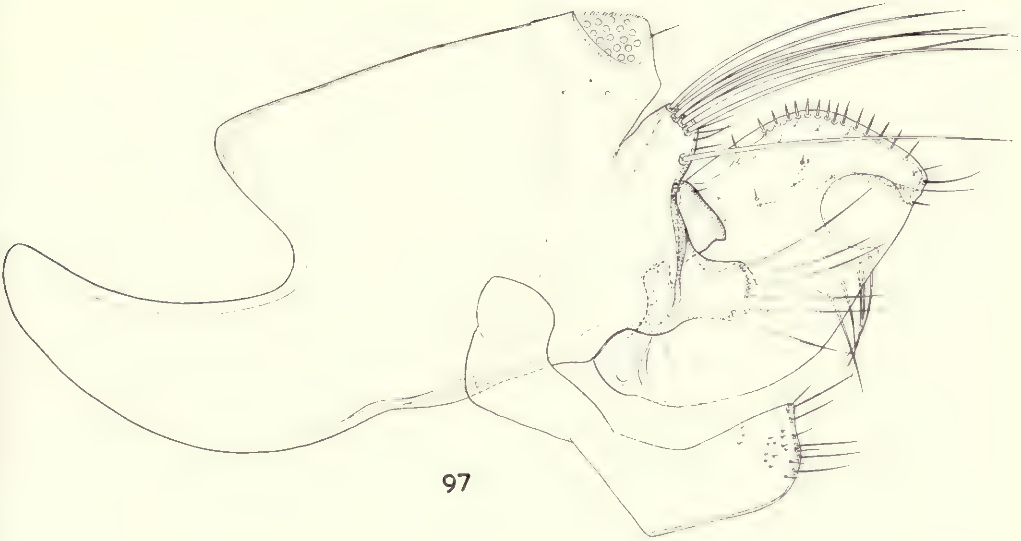


96

PLATE 22

Figs. 97–98. Segment IX, ♂, of (97) *Ctenophthalmus dilatatus* Wagner (Tarbagatai Mts., E. Kazakhstan) ; (98) *C. gigantospalacis gigantospalacis* Ioff (topotype).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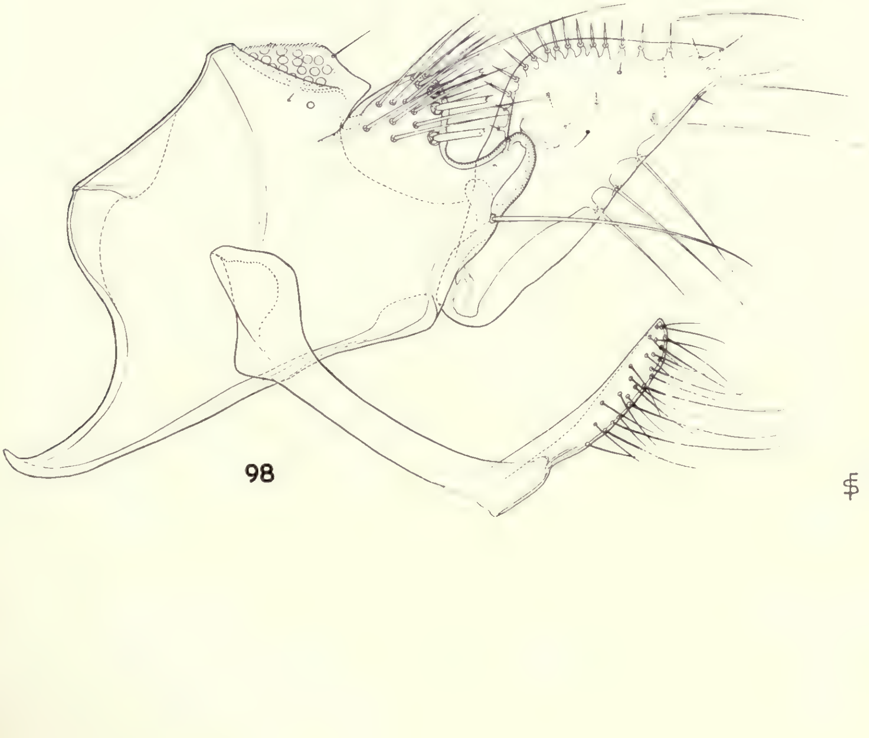
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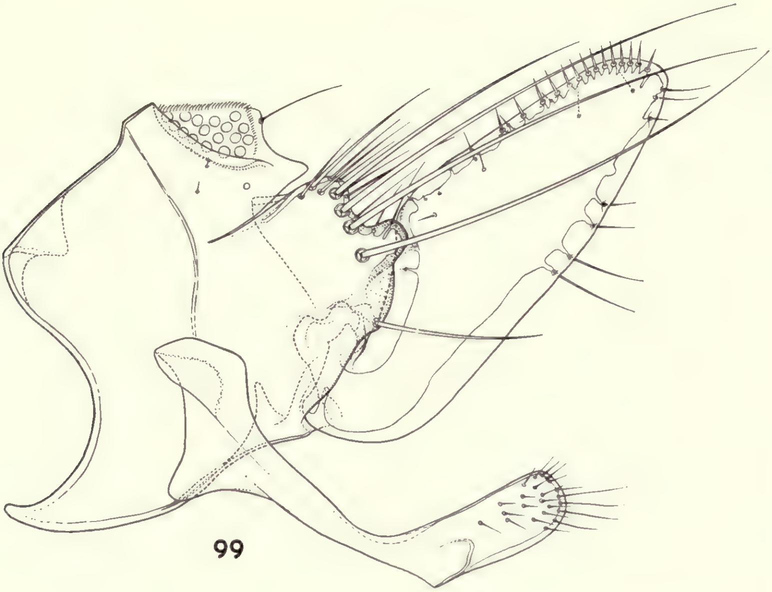
PLATE 23

FIGS. 99–100. Segment IX, ♂, of (99) *Ctenophthalmus caucasicus* (Taschenberg) (Mramorák/Deliblat, Yugoslavia) ; (100) *C. turcicus* Jordan (holotype).



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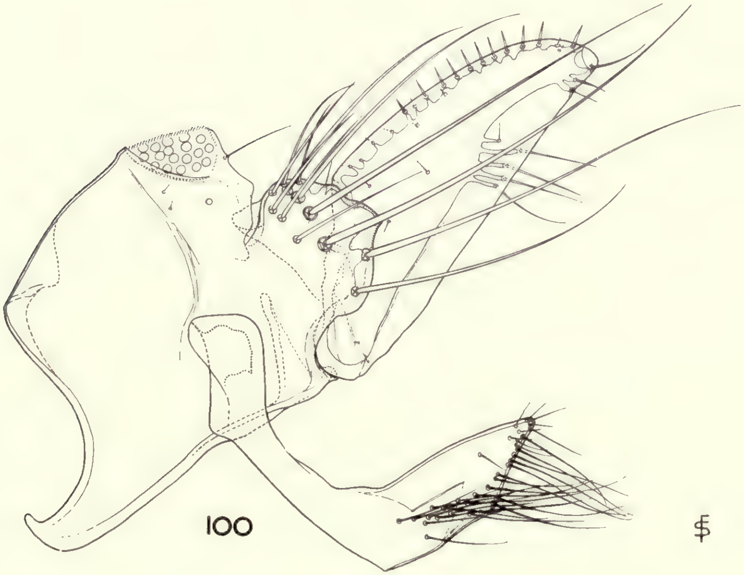

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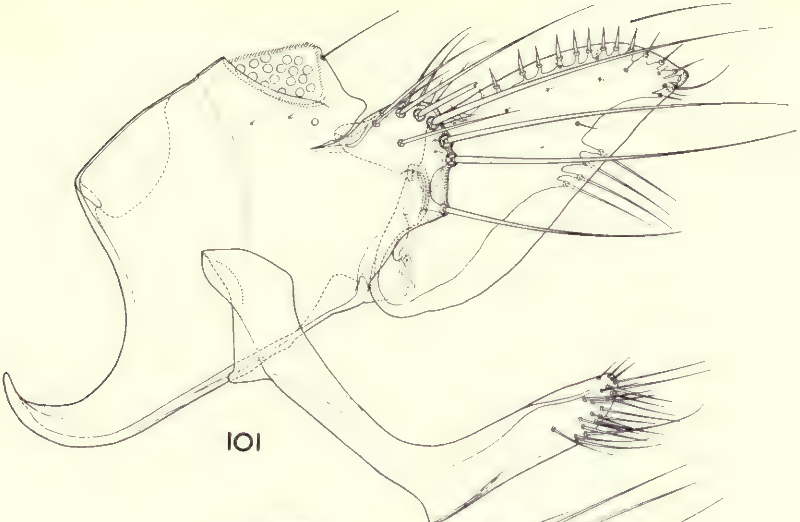
PLATE 24

FIGS. 101–104. Segment IX, ♂, of (101) *Ctenophthalmus inornatus* Wagner (holotype of *C. phrator*) (102) *C. pseudagyrtes pseudagyrtes* Baker (syntype) ; (103) *C. formosanus* Svihla (paratype) ; (104) *C. parcus* Jordan (holotype).



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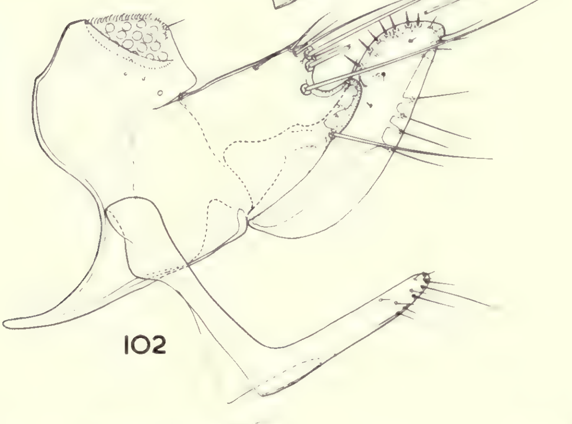

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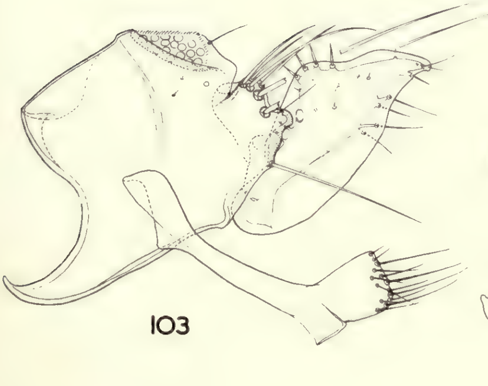

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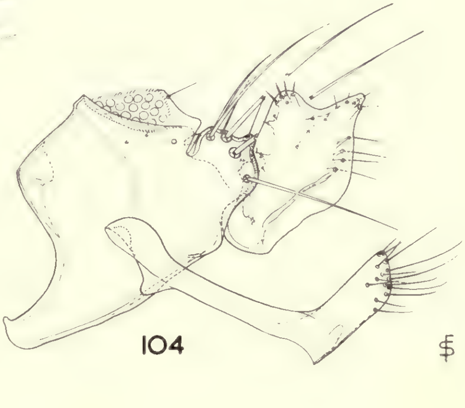
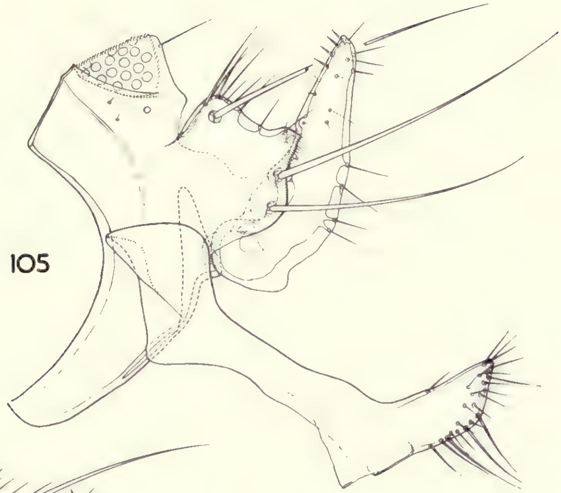


104

PLATE 25

Figs. 105–107. Segment IX, ♂, of (105) *Ctenophthalmus acuminatus* Ioff & Argyropulo (topotype) ; (106) *C. rettigi* Rothschild (Dobrogea, Romania) ; (107) *C. particularis* Berteaux (holotype).



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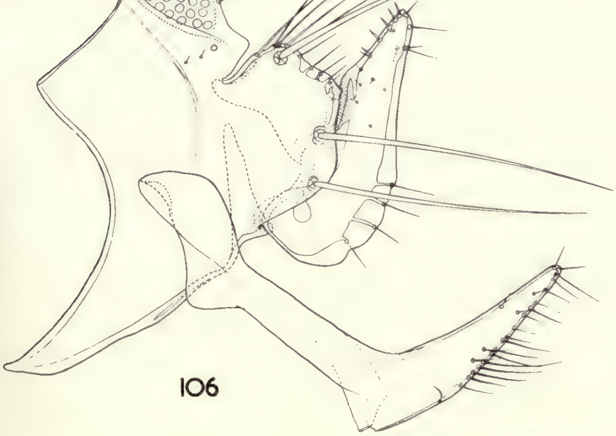

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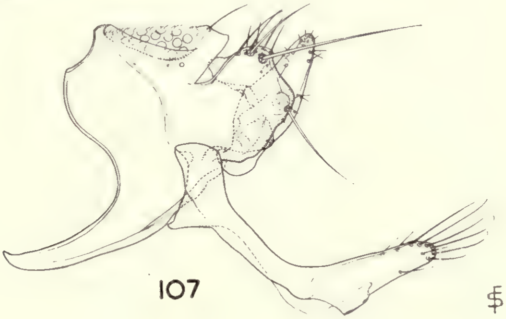

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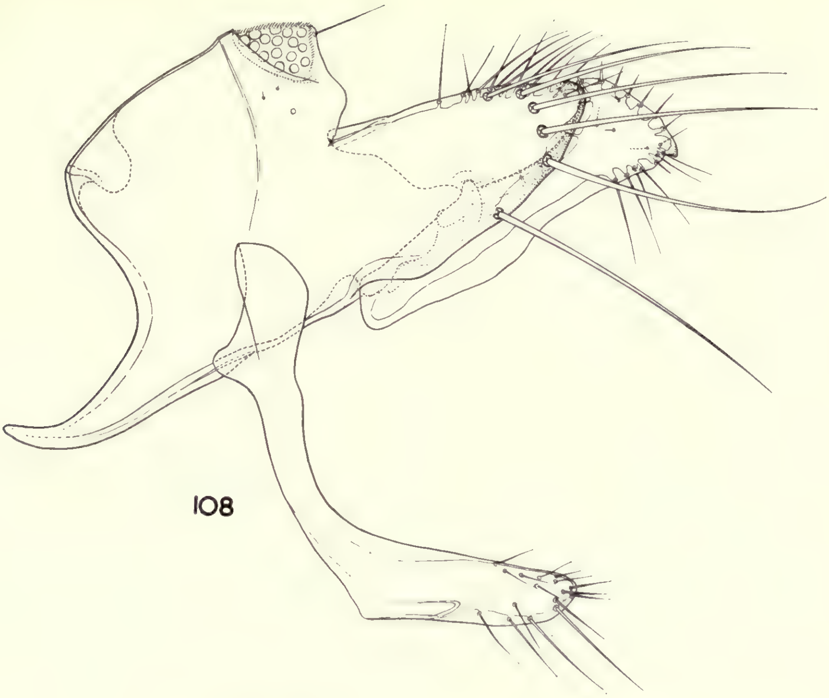
PLATE 26

FIGS. 108–109. Segment IX, ♂, of (108) *Ctenophthalmus triodontus* Rothschild (holotype) ; (109) *C. audax* Jordan & Rothschild (holotype).



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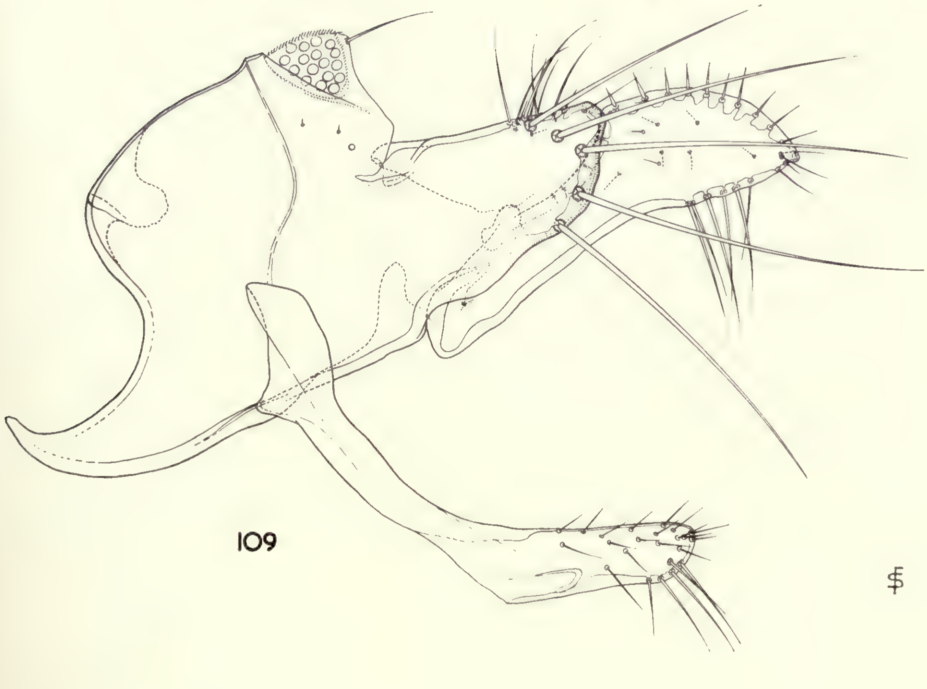

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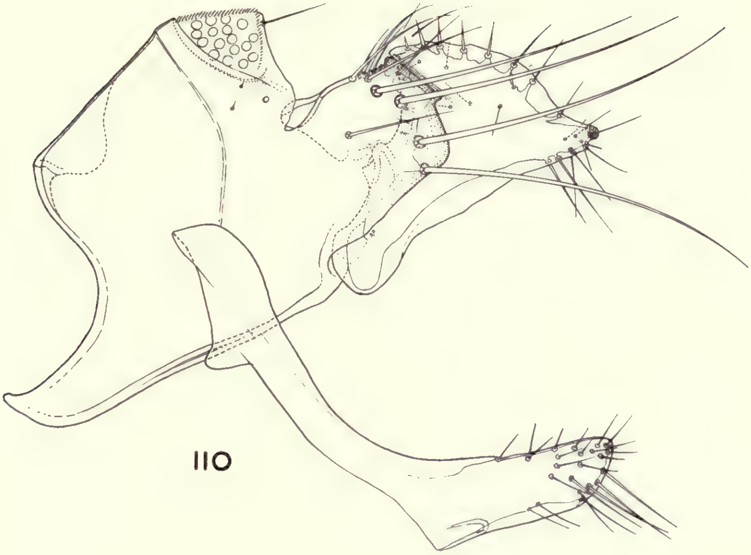
PLATE 27

Figs. 110–111. Segment IX, ♂, of (110) *Ctenophthalmus edwardsi* Jordan (paratype); (111) *C. moratus* Jordan (holotype).



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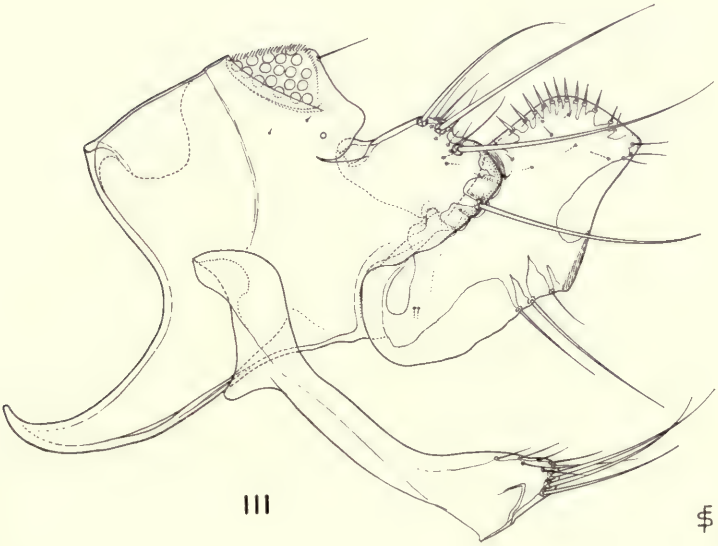

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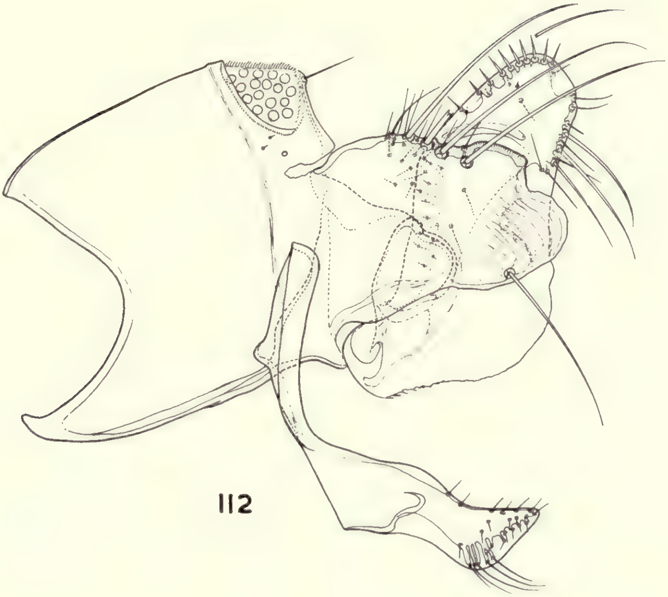
PLATE 28

Figs. 112–113. Segment IX, ♂, of (112) *Ctenophthalmus ominosus* Smit (holotype) ; (113) *C. evidens evidens* Jordan (Bufundi, Uganda).



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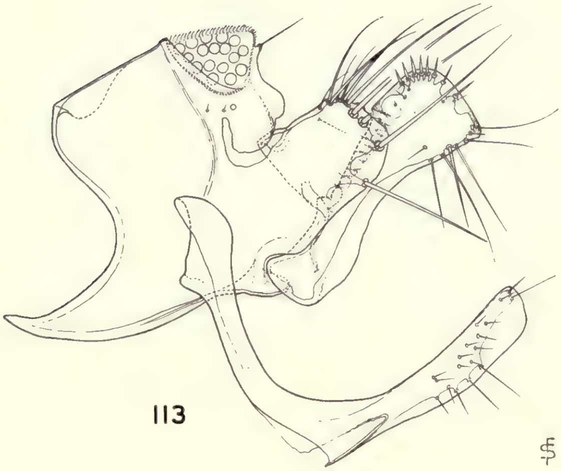

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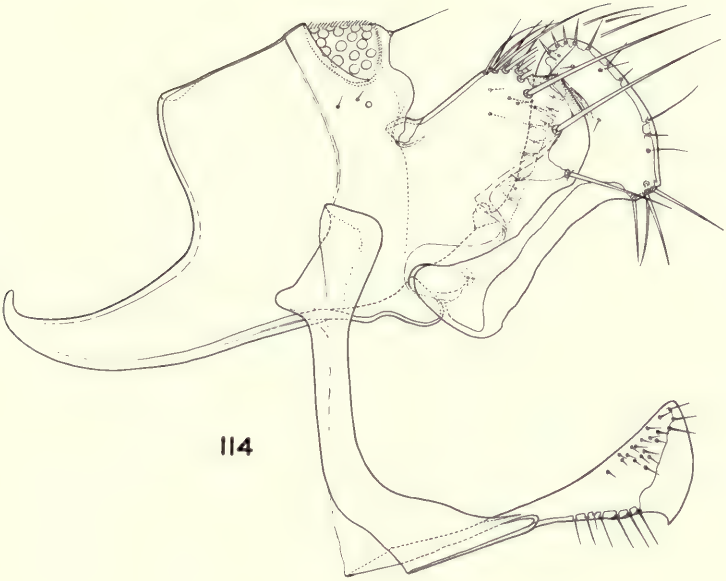
PLATE 29

FIGS. 114–115. Segment IX, ♂, of (114) *Ctenophthalmus lycosius* Jordan & Rothschild (holotype) ; (115) *C. acanthurus* Jordan & Rothschild (Kinangop, Kenya).



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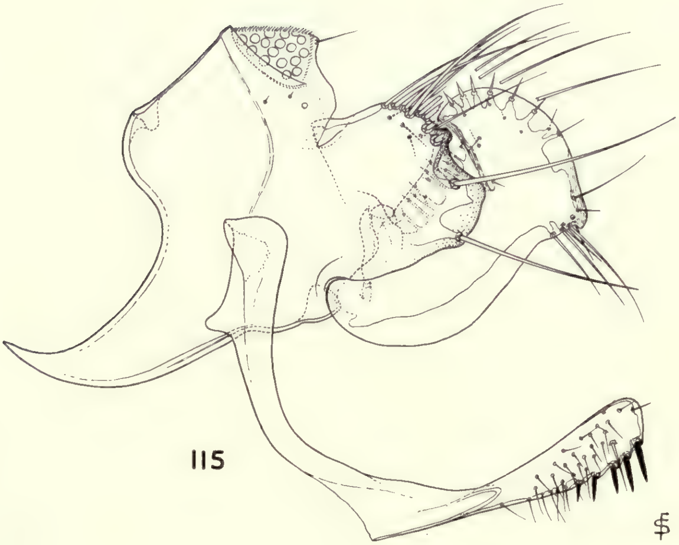

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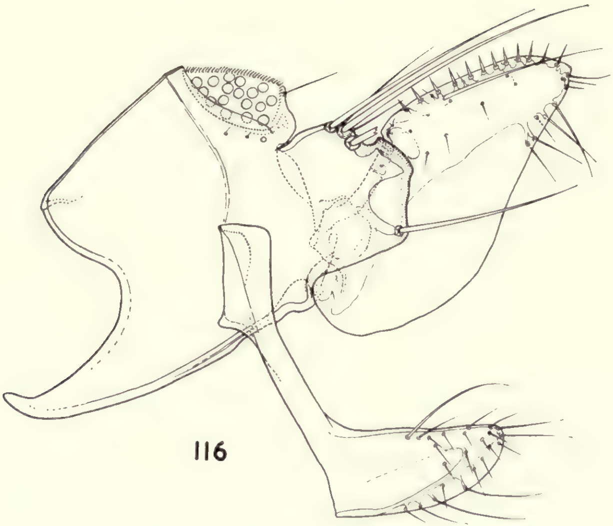
PLATE 30

Figs. 116–117. Segment IX, ♂, of (116) *Ctenophthalmus bacopus* Jordan (holotype) ; (117) *C. ansorgei ansorgei* Rothschild (Dilolo, Congo).



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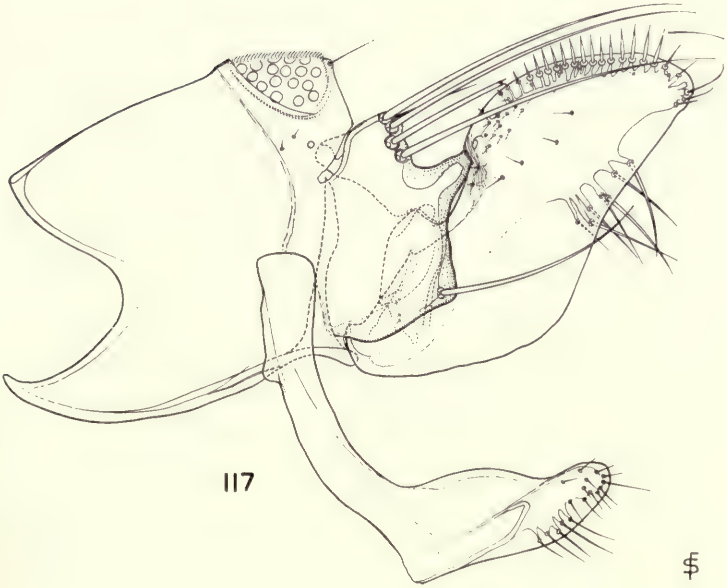
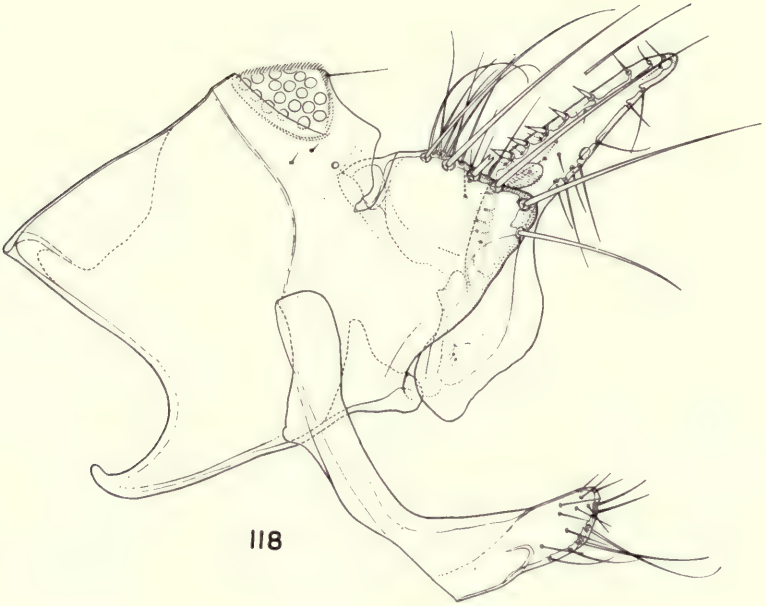


117

PLATE 31

FIGS. 118–119. Segment IX, ♂, of (118) *Ctenophthalmus stenurus* Jordan (holotype) ; (119) *C. eumeces* Jordan & Rothschild (Nakuru, Kenya).



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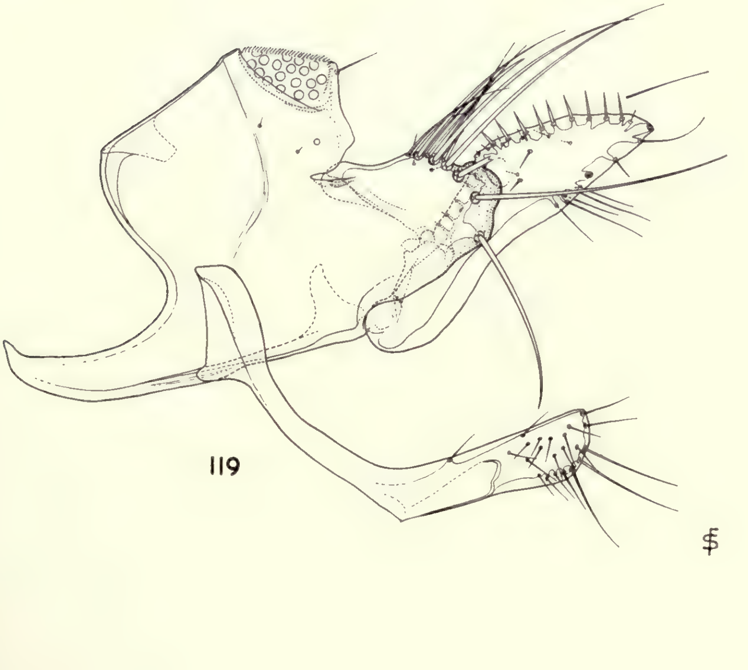

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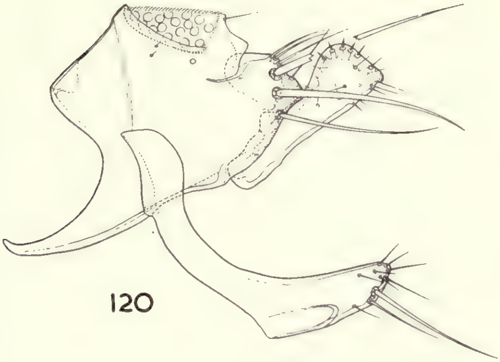
PLATE 32

Figs. 120–122. Segment IX, ♂, of (120) *Ctenophthalmus eximius* Jordan & Rothschild (paratype, Nalasangi, Uganda) ; (121) *C. cophurus* Jordan & Rothschild (holotype) ; (122) *C. arcanus* Smit (holotype).



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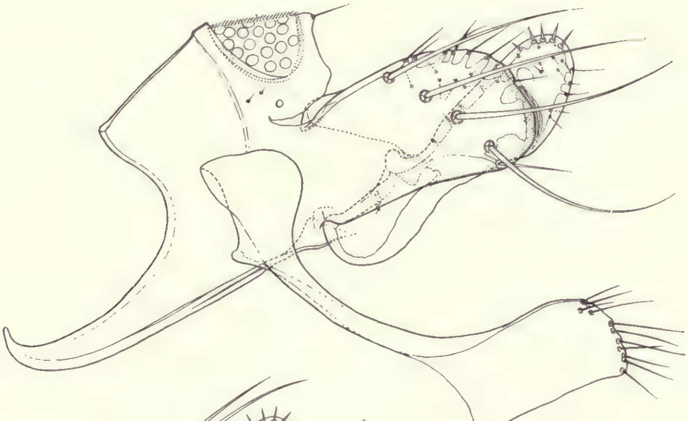

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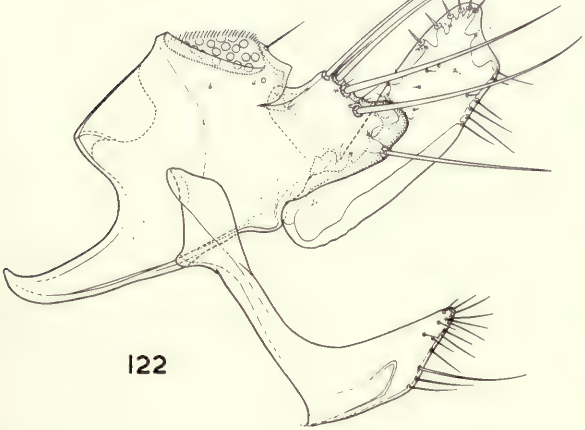
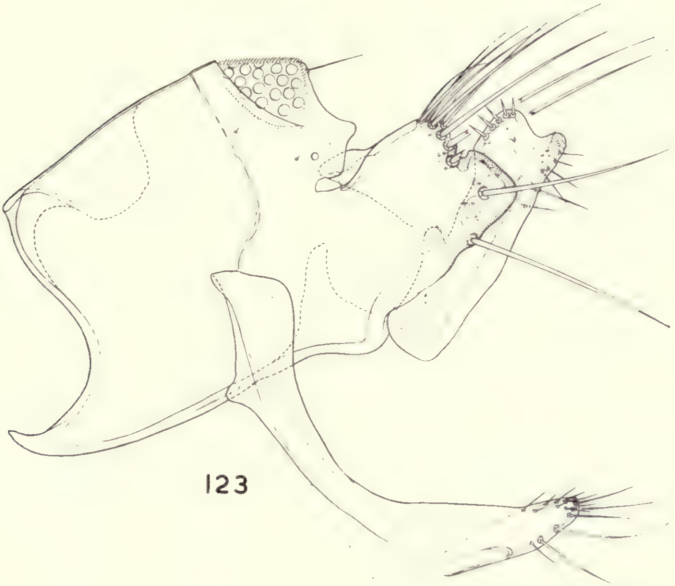


122

PLATE 33

FIGS. 123–124. Segment IX, ♂, of (123) *Ctenophthalmus singularis* Jordan (holotype) ; (124) *C. debrauwerei* Berteaux (holotype).



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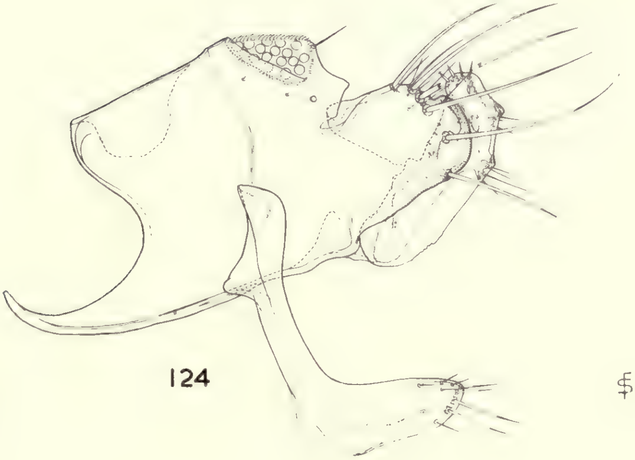

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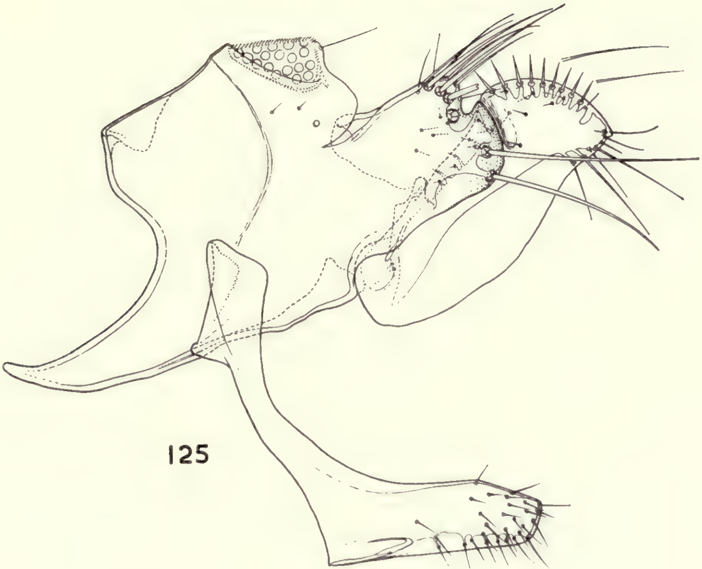
PLATE 34

Figs. 125–126. Segment IX, ♂, of (125) *Ctenophthalmus devignati* Jordan (Kunga, Congo) ; (126) *C. phyris* Jordan (Bulo village, Congo).



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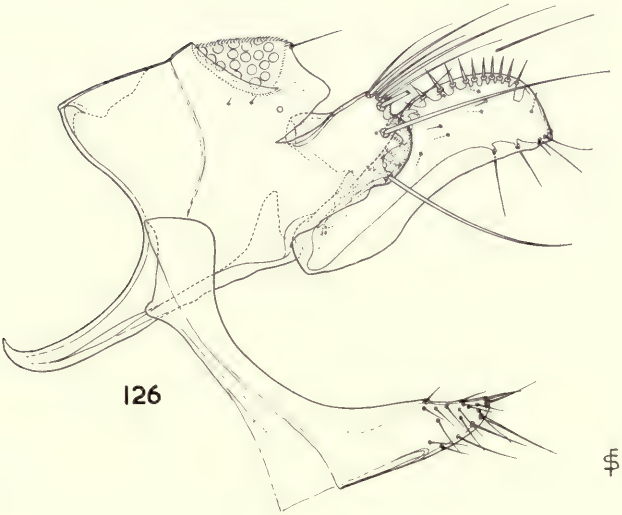
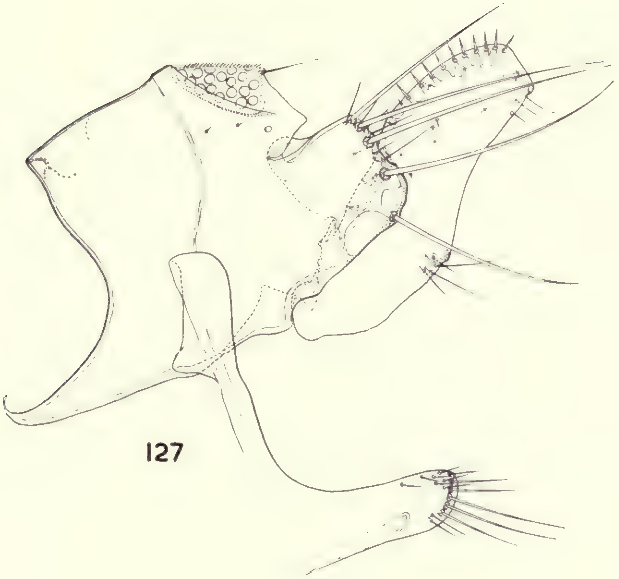


126

PLATE 35

FIGS. 127–128. Segment IX, ♂, of (127) *Ctenophthalmus vanhoofi* Berteaux (paratype); (128) *C. smithersi* De Meillon (holotype).



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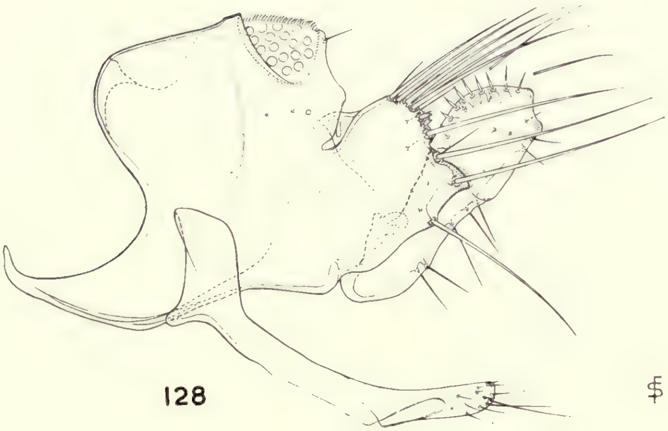
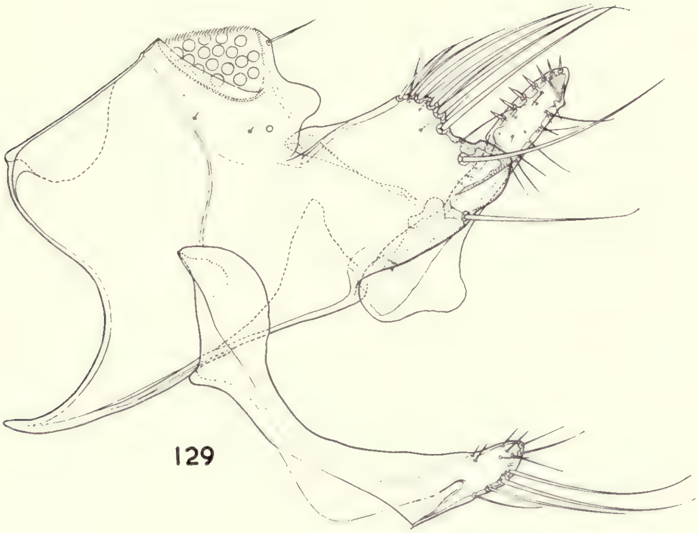


128

PLATE 36

Figs. 129–130. Segment IX, ♂, of (129) *Ctenophthalmus luberensis* Berteaux (topotype) ; (130) *C. blandulus* Smit (holotype).



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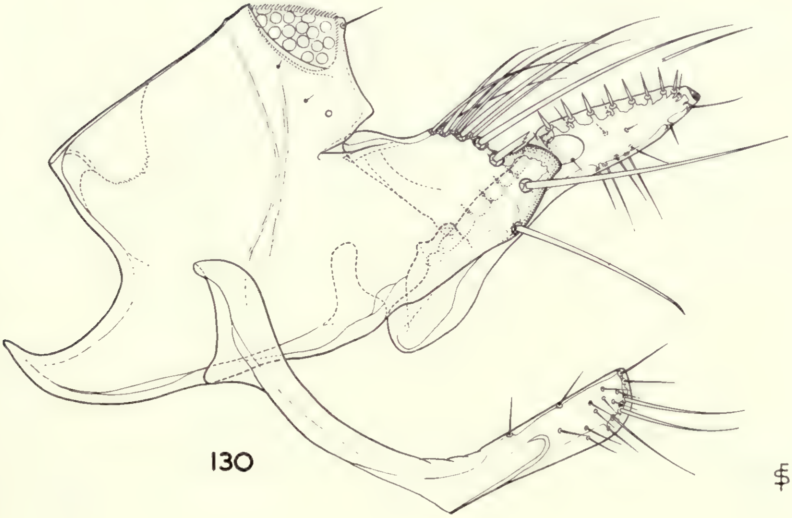
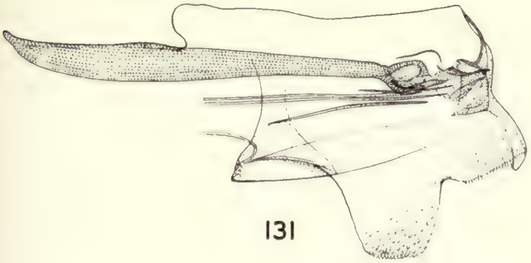


130

PLATE 37

Figs. 131–136. Phallosome of (131) *Ctenophthalmus agyrtes agyrtes* (Heller) (Terschelling, Netherlands) ; (132) *C. hispanicus* Jordan (holotype) ; (133) *C. andorrensis* Smit (paratype) ; (134) *C. bifidatus* Smit (paratype) ; (135) *C. arvernus* Jordan (paratype, nr. Ruffec, France) ; (136) *C. capriciosus* Smit (holotype).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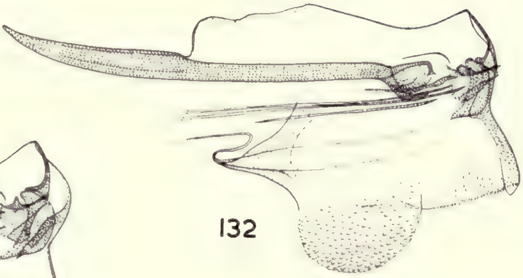
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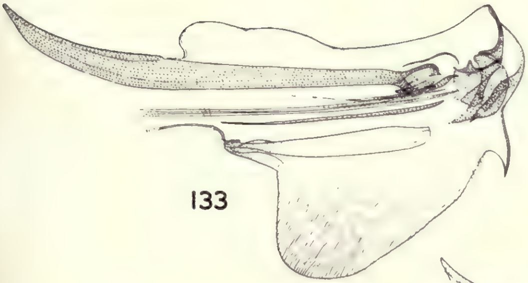
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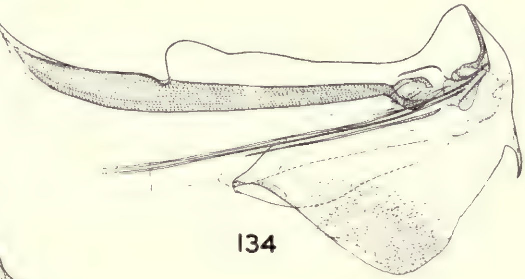
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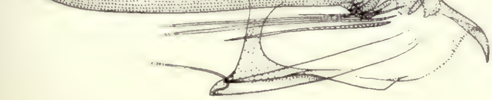
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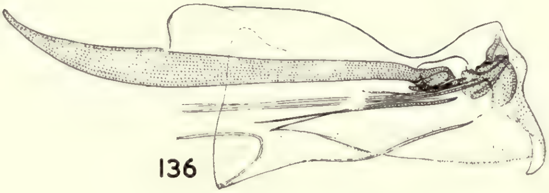
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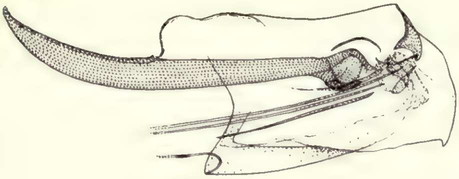
PLATE 38

Figs. 137–142. Phallosome of (137) *Ctenophthalmus proximus* (Wagner) (nr. Abant, Turkey) ; (138) *C. solutus solutus* Jordan & Rothschild (Berne, Switzerland) ; (139) *C. apertus apertus* Jordan & Rothschild (topotype) ; (140) *C. bisoctodentatus heselhausi* (Oudemans) (Wilp, Netherlands) ; (141) *C. russulae* Jordan & Rothschild (paratype) ; (142) *C. nivalis nivalis* Rothschild (Bonnenuit, France).



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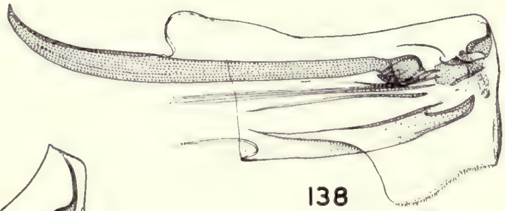

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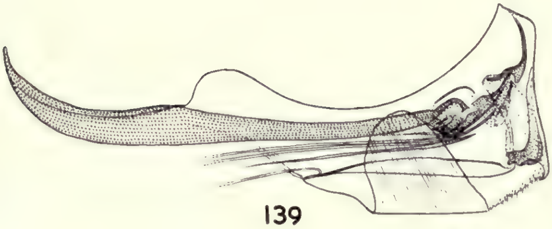

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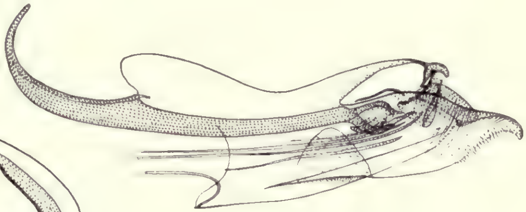

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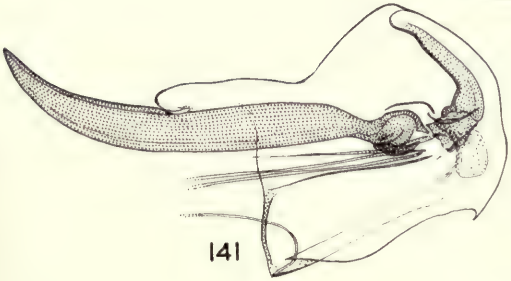

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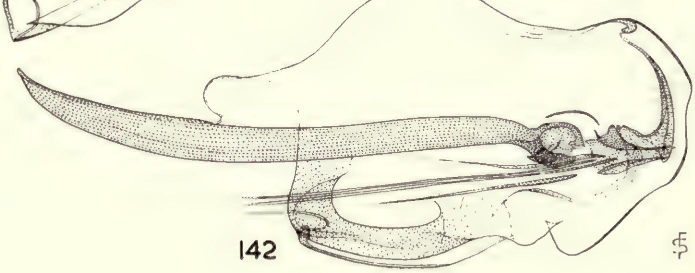

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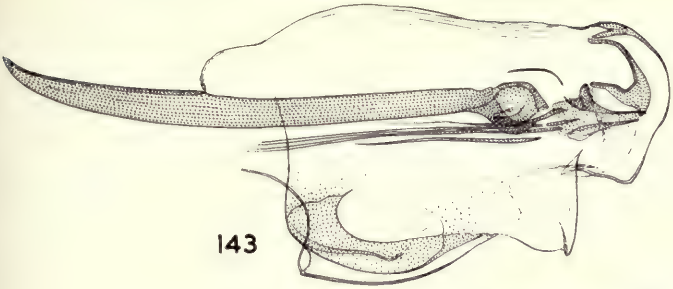
PLATE 39

FIGS. 143–147. Phallosome of (143) *Ctenophthalmus nifetodes martinorum* Smit (paratype, Ćos-Alija, Jugoslavia) ; (144) *C. dolomydis* Smit (holotype) ; (145) *C. golovi golovi* Ioff & Tiflov (Baksan, N. Caucasus) ; (146) *C. obtusus* Jordan & Rothschild (paratype) ; (147) *C. gratus gratus* Jordan & Rothschild (holotype).



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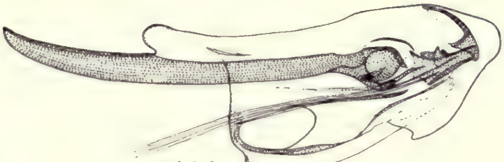

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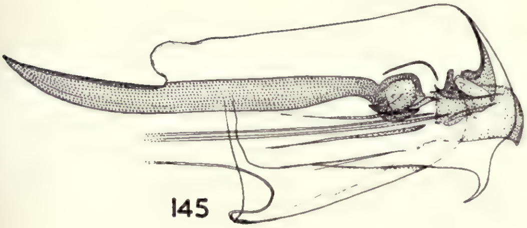

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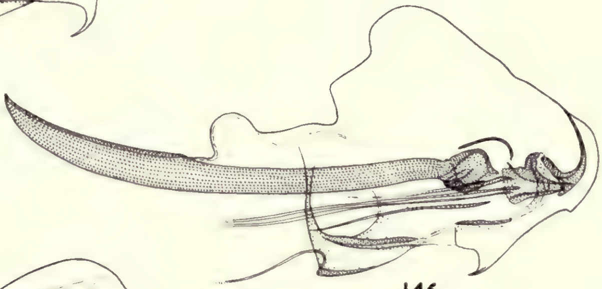

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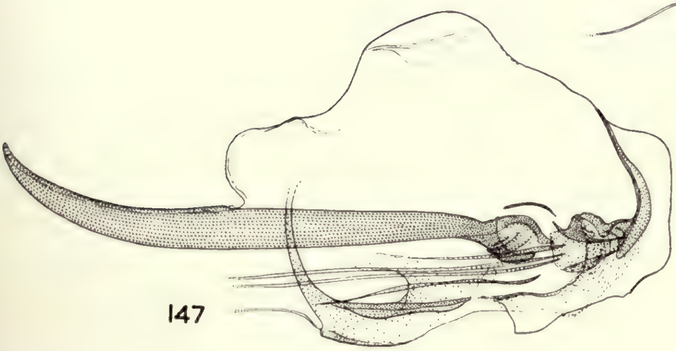

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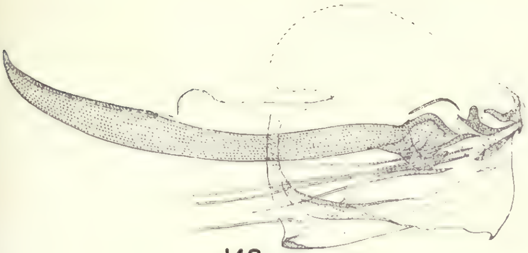
PLATE 40

Figs. 148–152. Phallosome of (148) *Ctenophthalmus parvus* Argyropulo (Kisha, N.W. Caucasus) ; (149) *C. iranus persicus* Smit (holotype) ; (150) *C. wagneri wagneri* Tiflov (N. Caucasus) ; (151) *C. arvalis* Wagner & Ioff (paratype) ; (152) *C. pollex* Wagner & Ioff (Chernyi Rynok, Groznenskaya oblast, U.S.S.R.)



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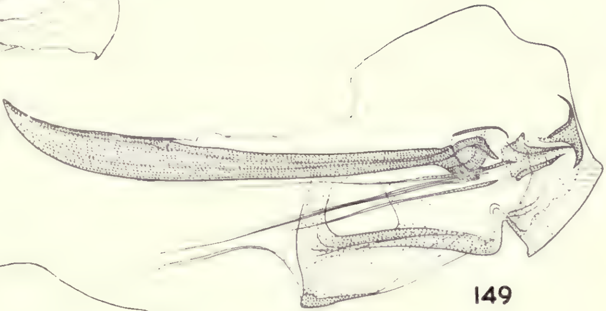

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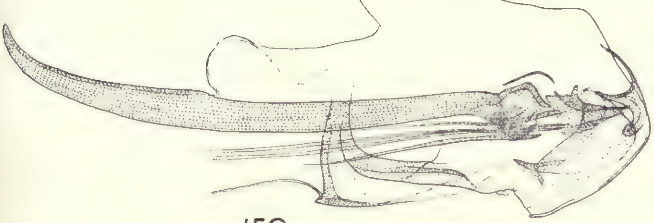

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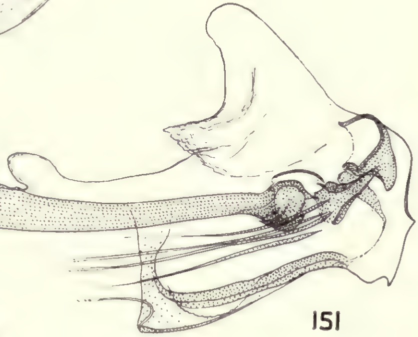

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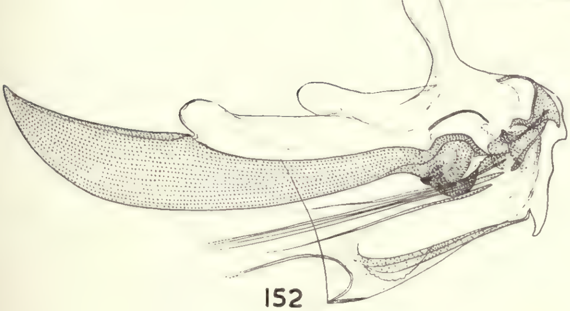

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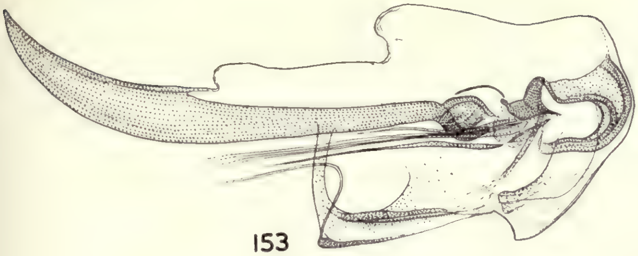
PLATE 41

Figs. 153–158. Phallosome of (153) *Ctenophthalmus orientalis* (Wagner) (Dobrogea, Romania) ; (154) *C. pisticus pisticus* Jordan & Rothschild (Mondy, Buryat-Mongol'-skaya, A.S.S.R.) ; (155) *C. formosanus* Svihla (paratype) ; (156) *C. parcus* Jordan (paratype) ; (157) *C. dolichus dolichus* Rothschild (topotype) ; (158) *C. dux* Jordan & Rothschild (holotype).



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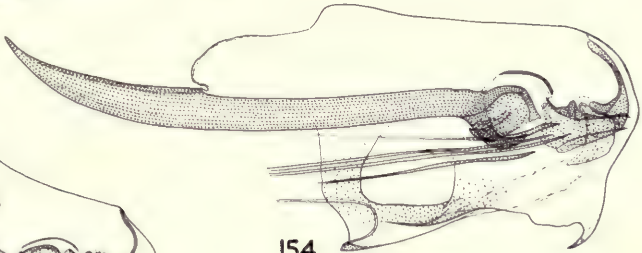

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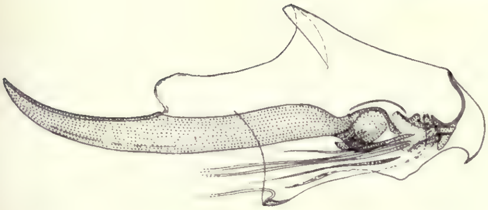

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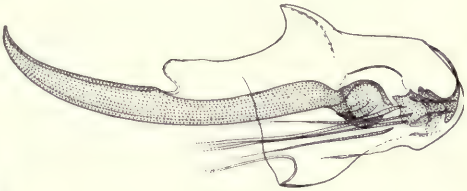

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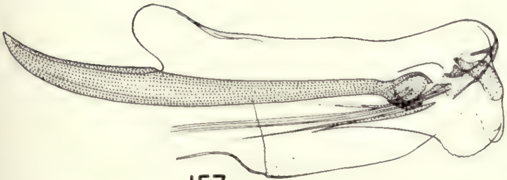

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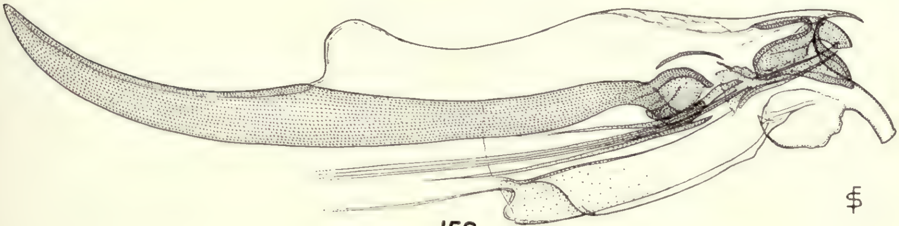

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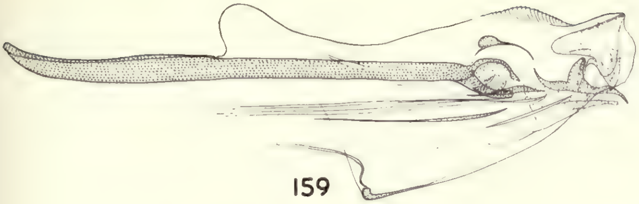
PLATE 42

Figs. 159–163. Phallosome of (159) *Ctenophthalmus dilatatus* Wagner (Katon-Karagai, Altai, U.S.S.R.) ; (160) *C. gigantospalacis uralospalacis* Tiflov (Uralsk region, Kazakhstan, U.S.S.R.) ; (161) *C. caucasicus* (Taschenberg) (Zagreb, Yugoslavia) ; (162) *C. turcicus* Jordan (holotype) ; (163) *C. inornatus* Wagner (paratype).



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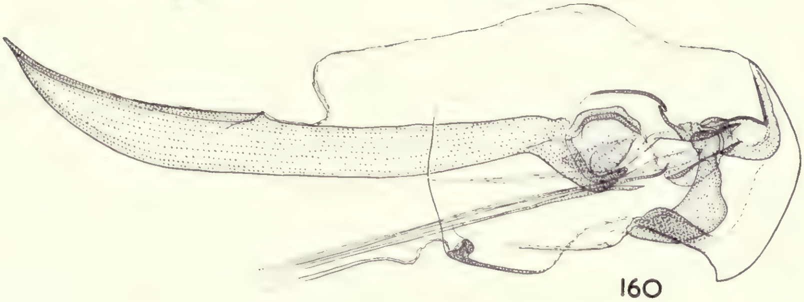

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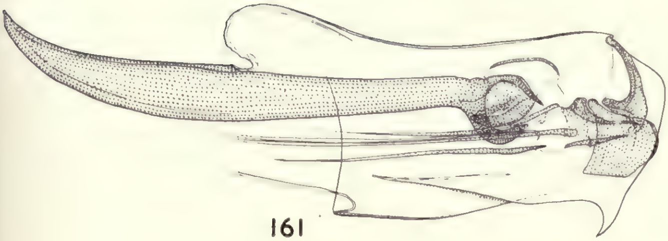

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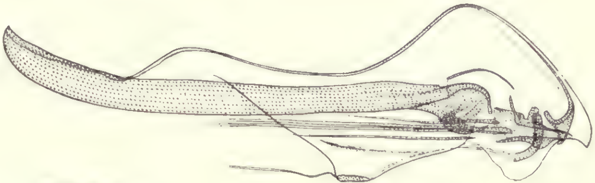

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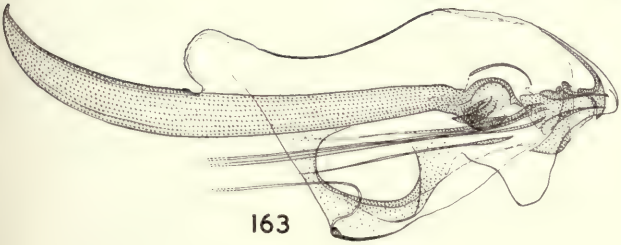

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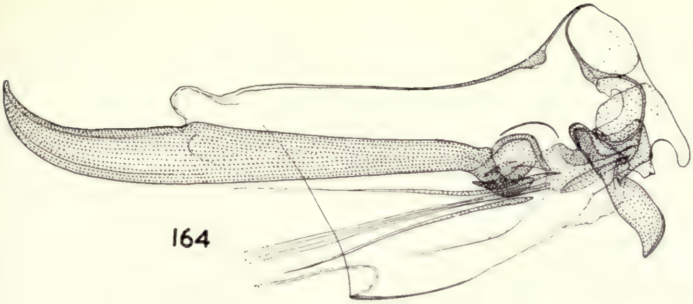
PLATE 43

FIGS. 164–168. Phallosome of (164) *Ctenophthalmus rettigi* Rothschild (Dobrogea, Romania) ; (165) *C. acuminatus* Ioff & Argyropulo (topotype) ; (166) *C. audax* Rothschild (paratype) ; (167) *C. edwardsi* Jordan (paratype) ; (168) *C. triodontus* Rothschild (holotype).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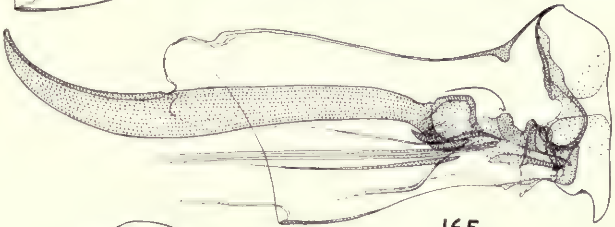
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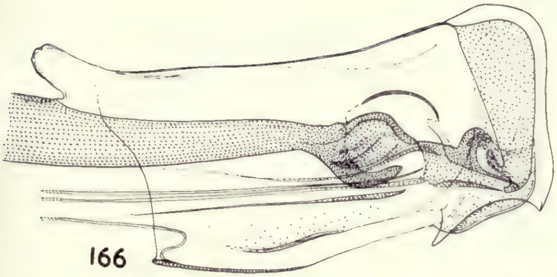
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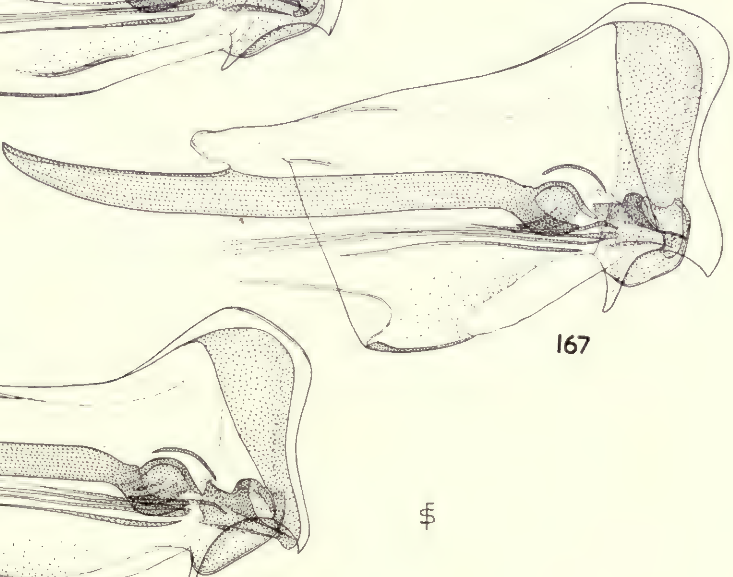
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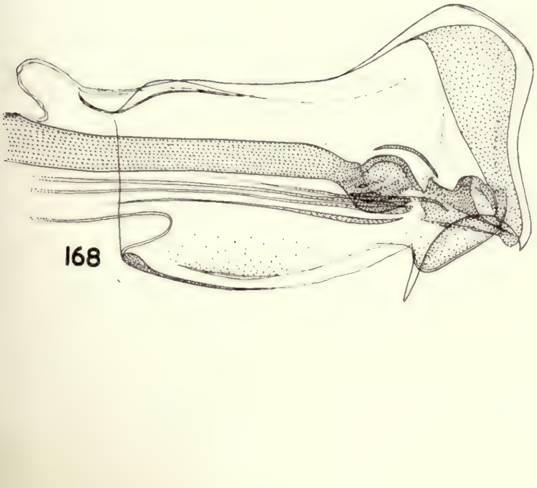
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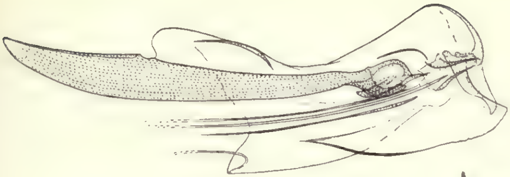
PLATE 44

FIGS. 169–174. Phallosome of (169) *Ctenophthalmus pseudagyrtes pseudagyrtes* Baker (Adirondack Lodge, N.Y., U.S.A.) ; (170) *C. particularis* Berteaux (holotype) ; (171) *C. moratus* Jordan (holotype) ; (172) *C. ominosus* Smit (holotype) ; (173) *C. evidens evidens* Jordan (holotype) ; (174) *C. acanthurus* Jordan & Rothschild (topotype).



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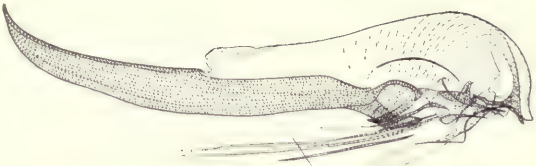

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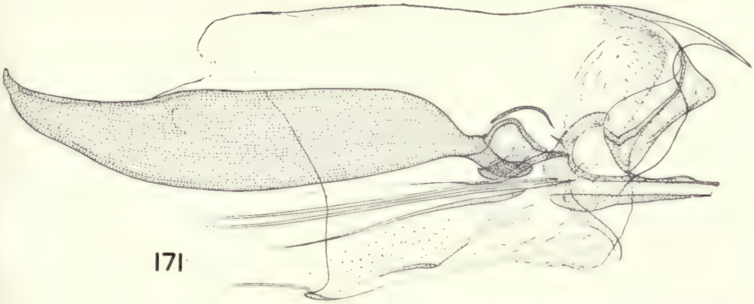

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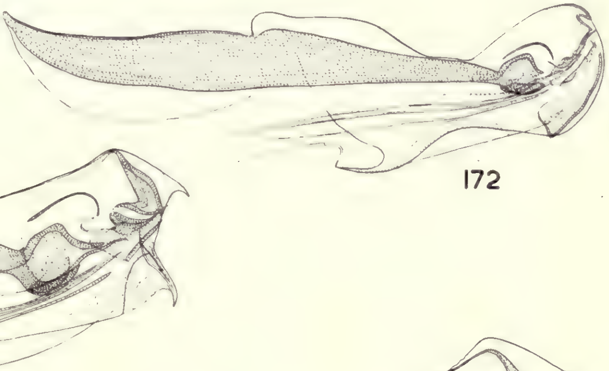

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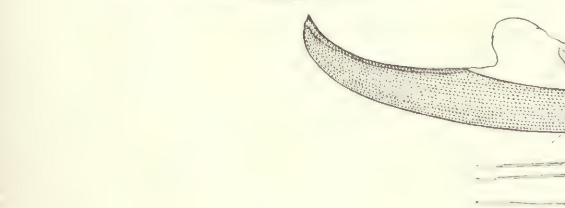

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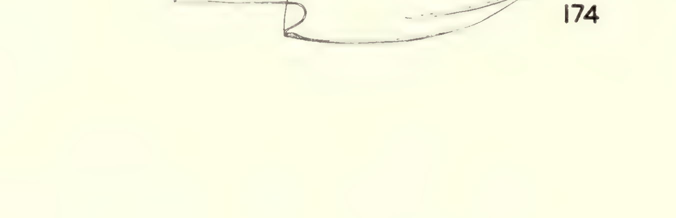
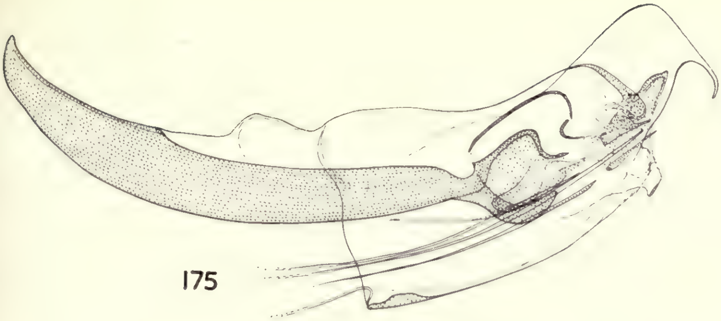


174

PLATE 45

Figs. 175–179. Phallosome of (175) *Ctenophthalmus lycosius* Jordan & Rothschild (holotype) ; (176) *C. eumeces* Jordan & Rothschild (Nakuru, Kenya) ; (177) *C. nyikensis* Smit (holotype) ; (178) *C. stenurus* Jordan (holotype) ; (179) *C. bacopus* Jordan (Atiak, Uganda, paratype).



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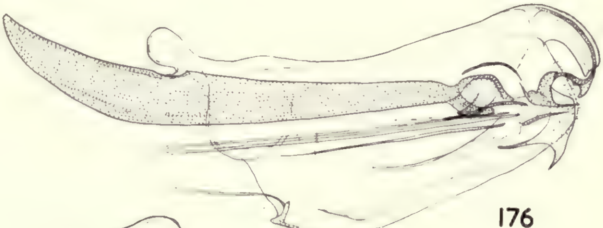

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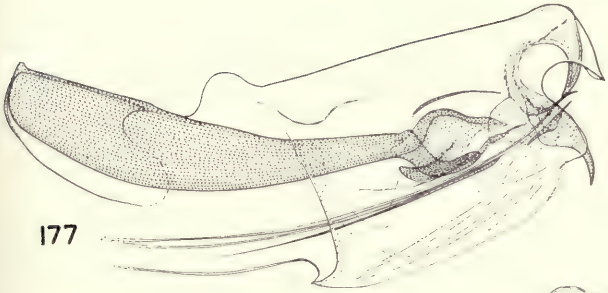

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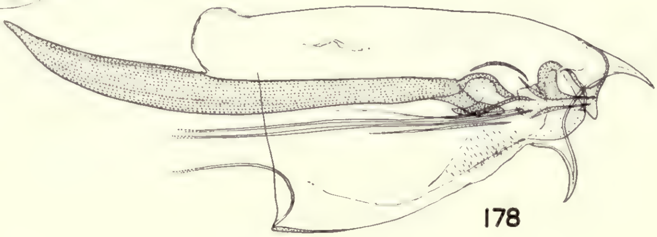

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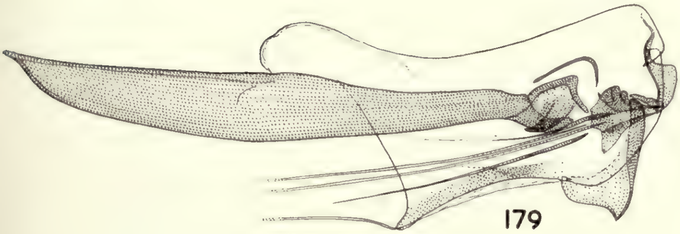

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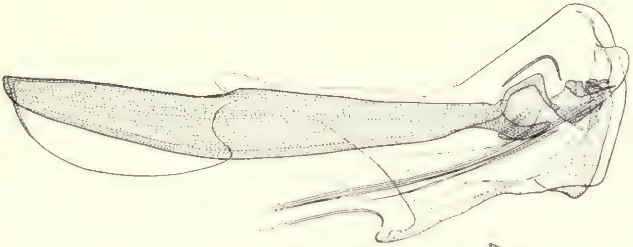
PLATE 46

Figs. 180–185. Phallosome of (180) *Ctenophthalmus allisoni* Smit (holotype) ; (181) *C. eximius* Jordan & Rothschild (paratype, Nalasangi, Uganda) ; (182) *C. cophurus* Jordan & Rothschild (holotype) ; (183) *C. arcanus* Smit (holotype) ; (184) *C. phyris* Jordan (Bulo village, Congo) ; (185) *C. luberensis* Berteaux (topotype).



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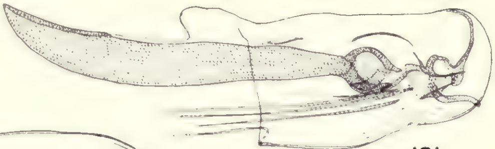

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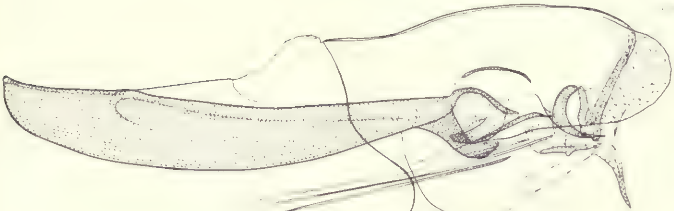

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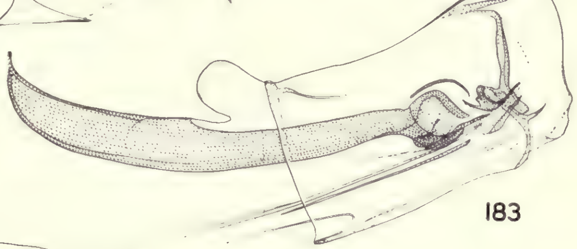

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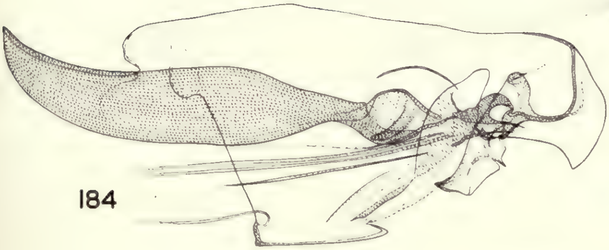

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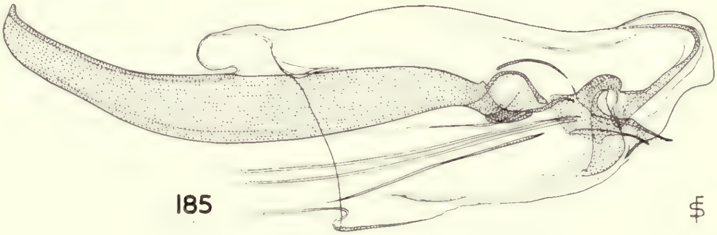
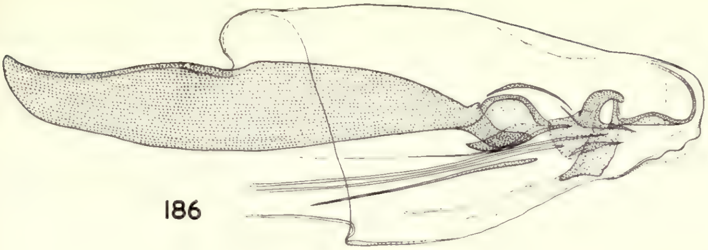


185

PLATE 47

FIGS. 186–190. Phallosome of (186) *Ctenophthalmus singularis* Jordan (Mt Elgon, Kenya) ; (187) *C. vanhoofi* Berteaux (holotype) ; (188) *C. debrauwerei* Berteaux (Lubero, Congo) ; (189) *C. smithersi* De Meillon (holotype) ; (190) *C. devignati* Jordan (Lubero, Congo).



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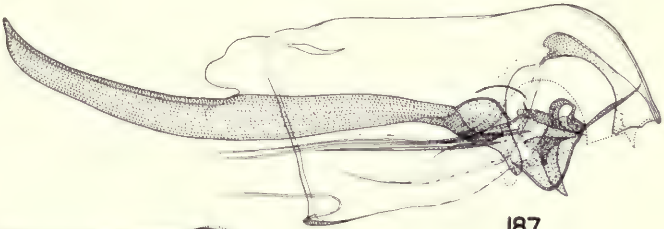

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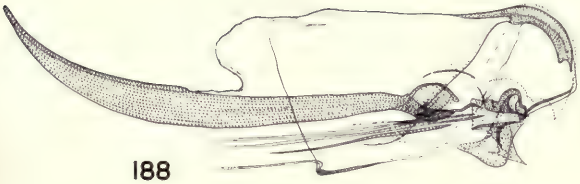

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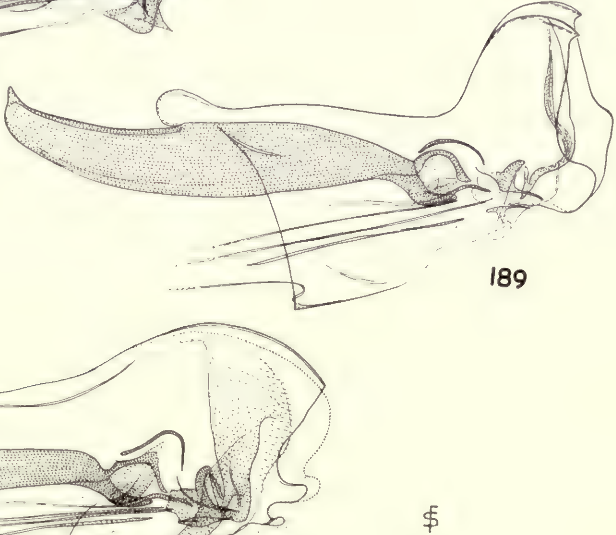

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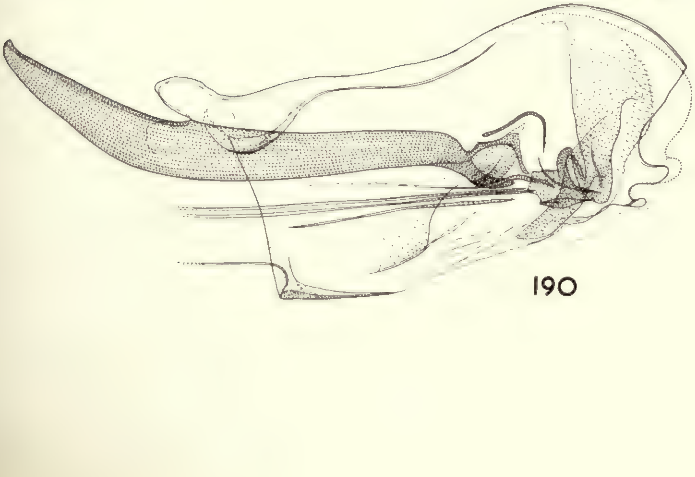

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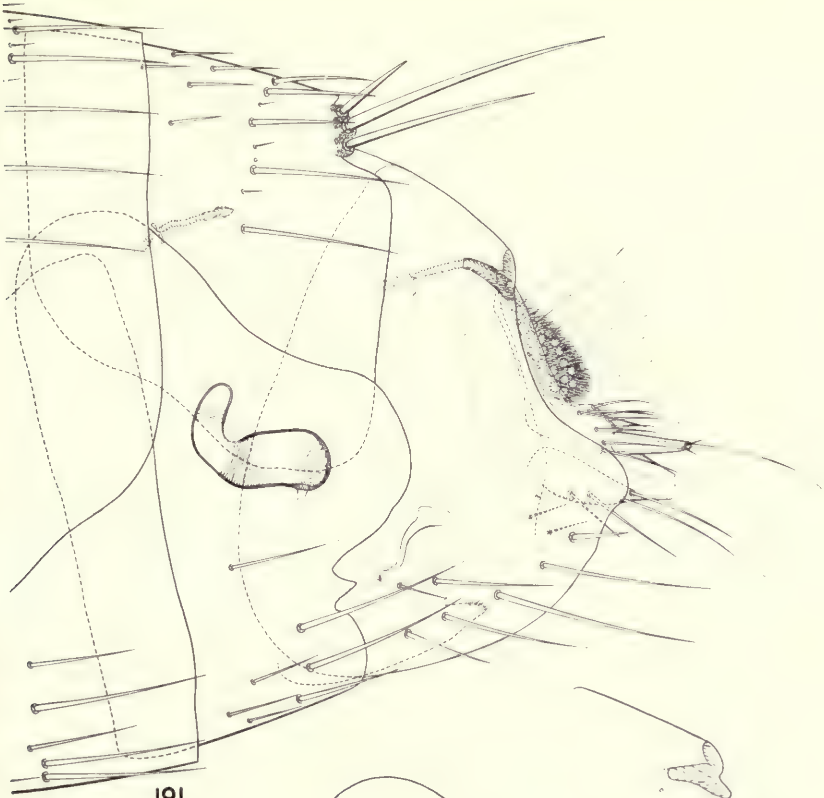
PLATE 48

FIGS. 191–192. Terminal abdominal segments of ♀ (191) *Ctenophthalmus bifidatus* Smit (allotype). Sternum VII and segment VIII of ♀ (192) *C. russulae* Jordan & Rothschild (paratype).



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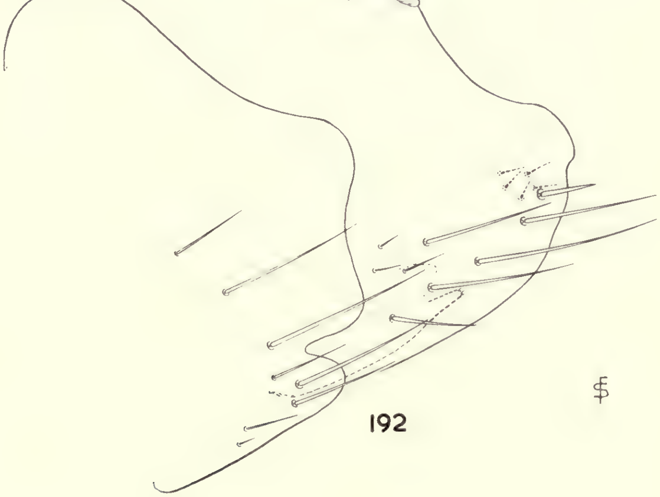

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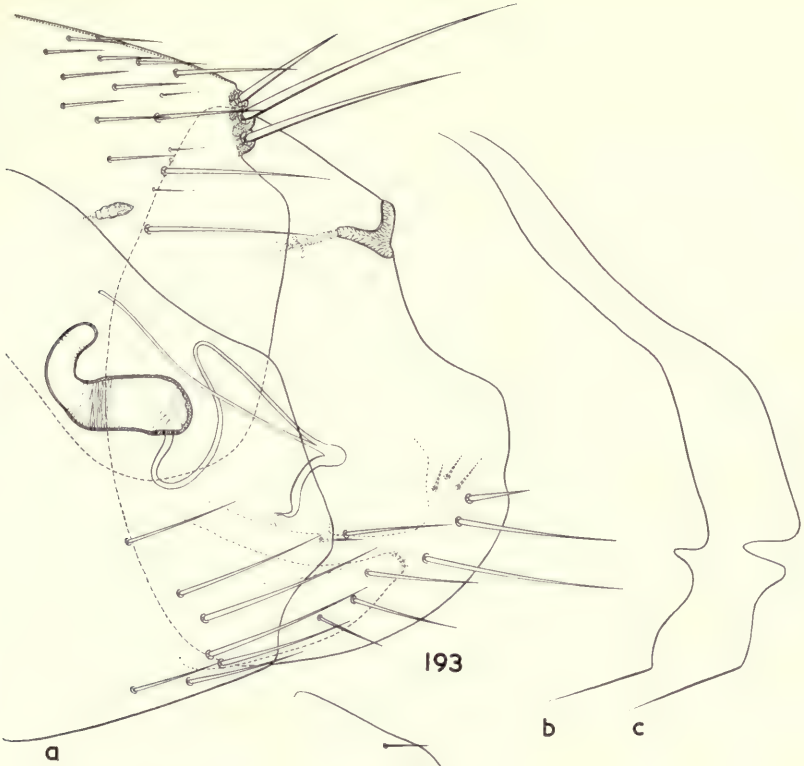
PLATE 49

Figs. 193–194. Segments VII and VIII and genitalia of (193a) ♀ ***Ctenophthalmus solutus solutus*** Jordan & Rothschild (Romanel, Switzerland) and variations in outline of sternum VII (193b (Bex, Switzerland), 193c (Wien, Austria)). Sternum VII, segment VIII and spermatheca of (194) *C. **nifetodes eugeniae*** Wagner (paratype).



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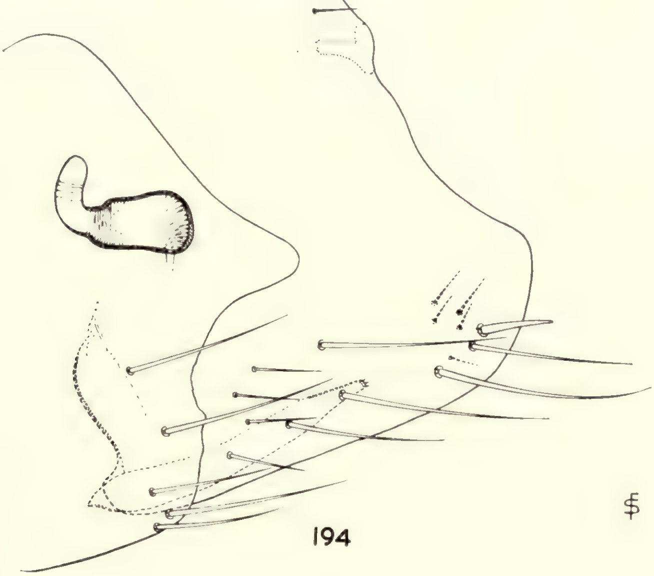

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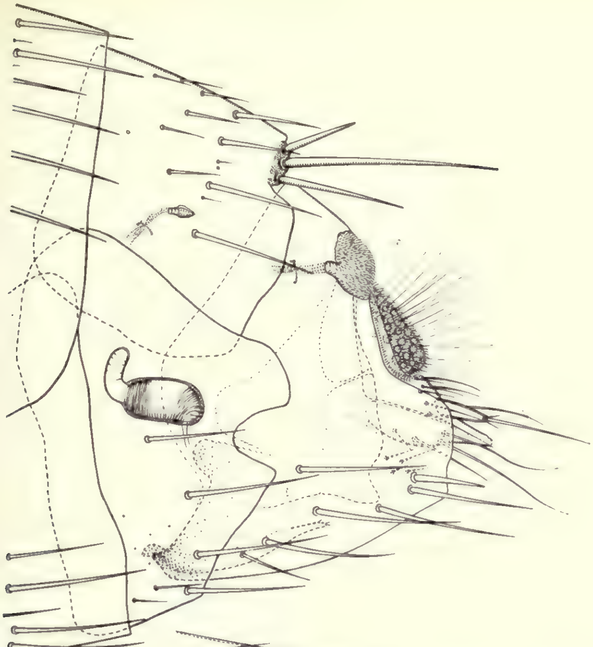
PLATE 50

FIGS. 195–196. Terminal abdominal segments, ♀, of (195) *Ctenophthalmus congener congener* Rothschild (St Albans, England) ; (196) *C. iranus persicus* Smit (allotype).



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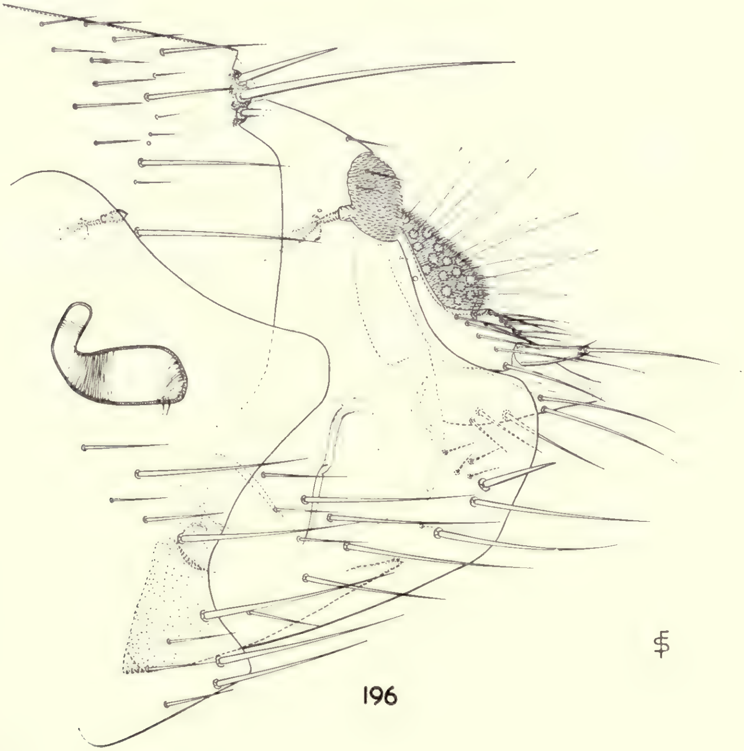

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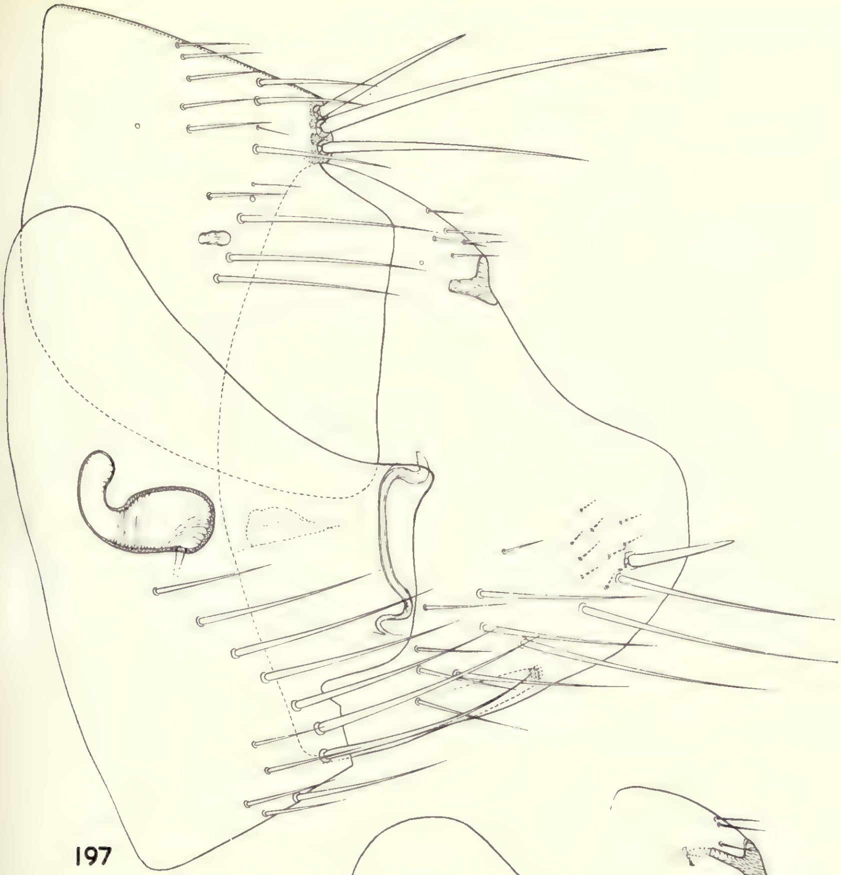
PLATE 51

Figs. 197–198. Segments VII and VIII and genitalia, ♀, of (197) *Ctenophthalmus spalacis* Jordan & Rothschild (Voronesh, U.S.S.R.). Sternum VII, segment VIII and genitalia, ♀, of (198) *C. dolomydis* Smit (allotype).



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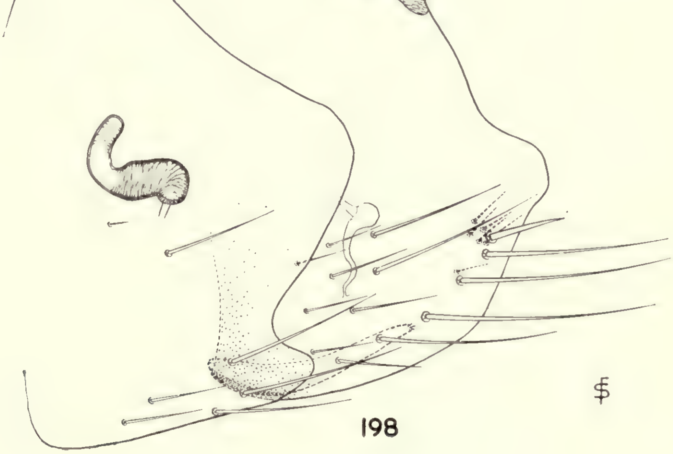

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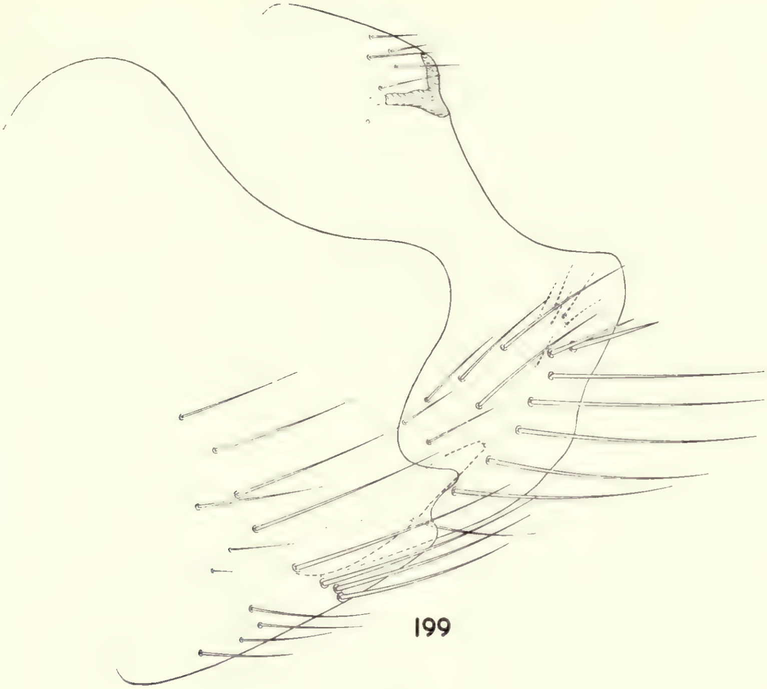
PLATE 52

FIGS. 199–200. Sternum VII and segment VIII, ♀, of (199) *Ctenophthalmus dilatatus* Wagner (Tarbagatai Mts, E. Kazakhstan) ; (200) *C. dolichus dolichus* Rothschild (topotype).



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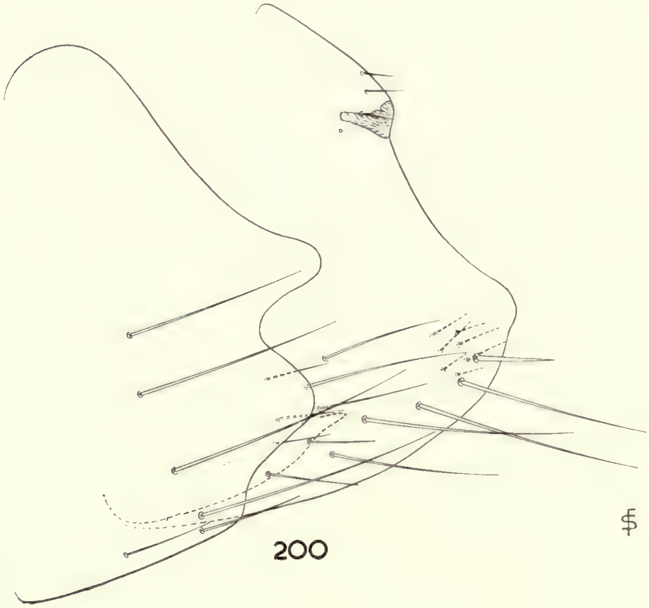

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PLATE 53

FIG. 201. Segments VII and VIII and genitalia, ♀, of *Ctenophthalmus rettigi* Rothschild (paratype).

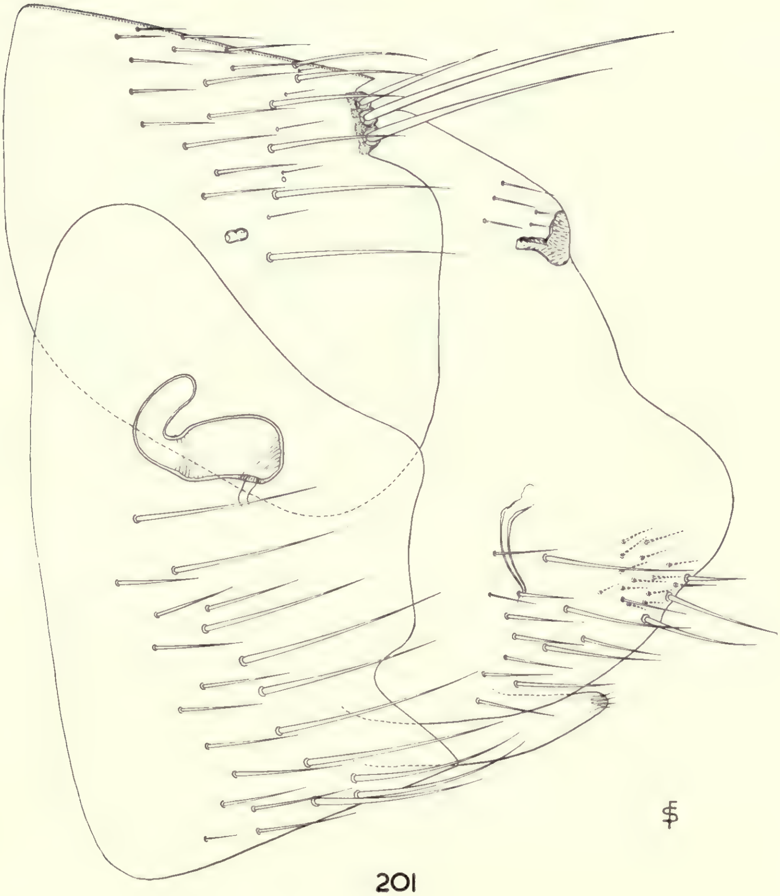

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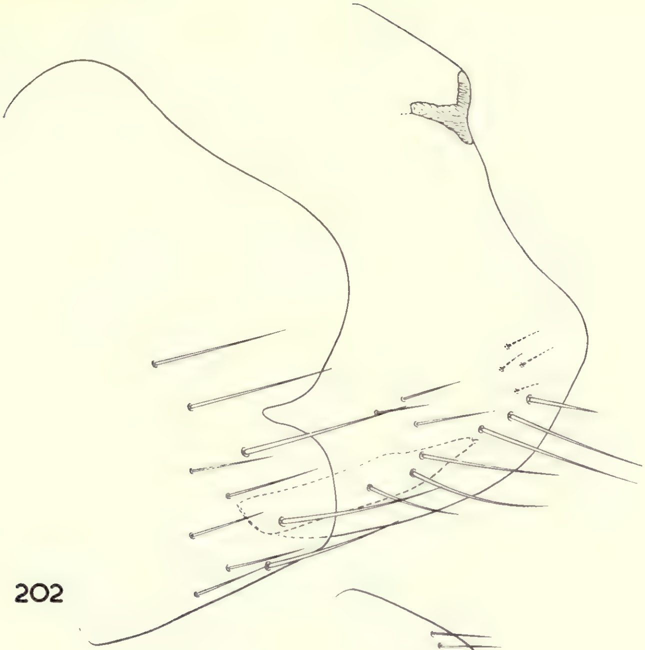
PLATE 54

FIGS. 202–203. Sternum VII and segment VIII, ♀, of (202) *Ctenophthalmus pseudagyrtes pseudagyrtes* Baker (Madison, Wisconsin). Sternum VII, segment VIII and spermatheca, ♀, of (203) *C. dux* Jordan & Rothschild (paratype).



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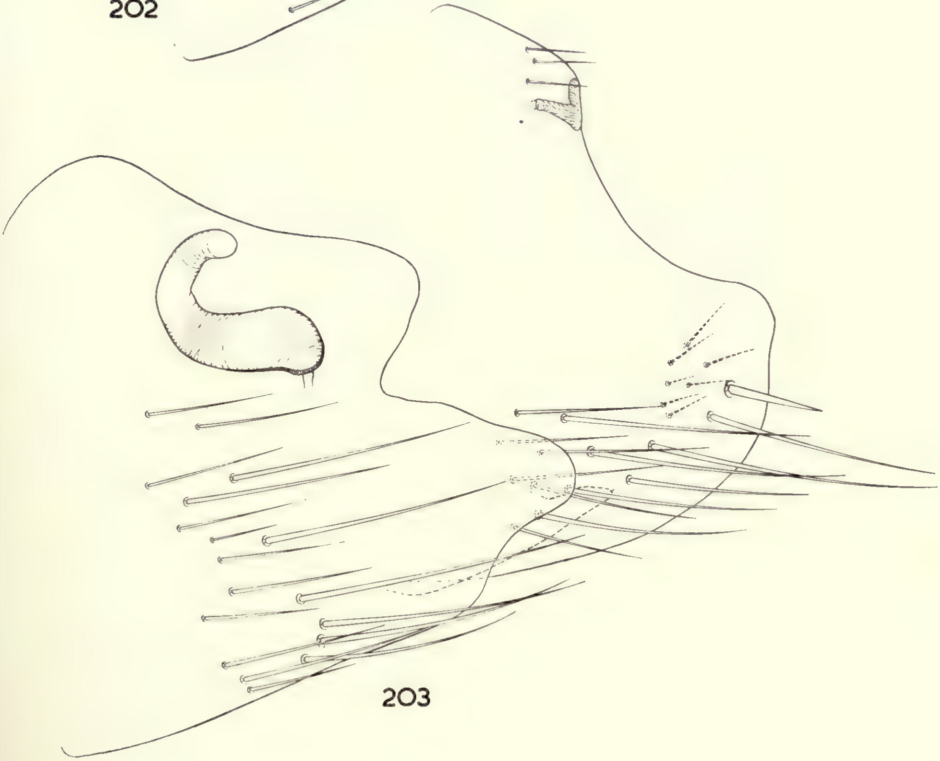

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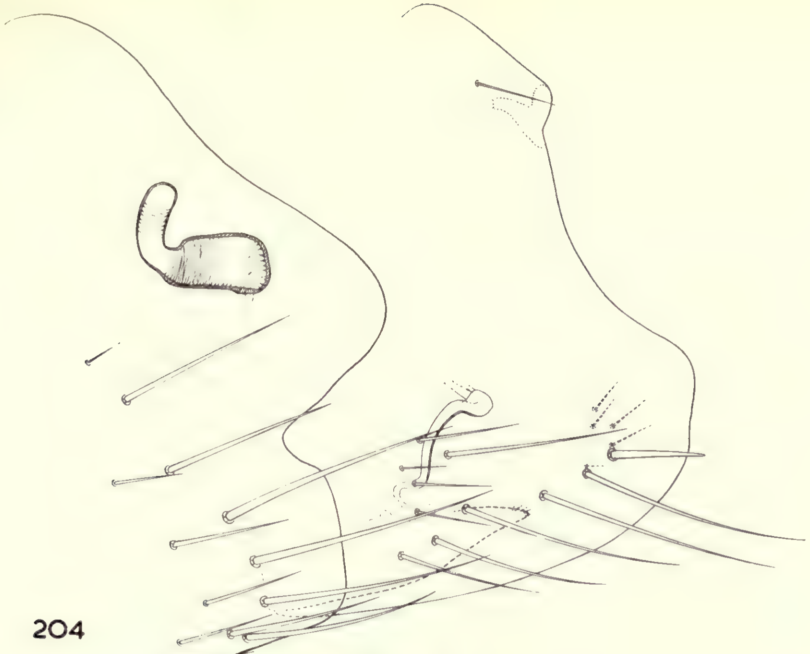
PLATE 55

Figs. 204–205. Sternum VII, segment VIII and genitalia, ♀, of (204) *Ctenophthalmus monticola* (Kohaut) (Kućište nr Peć, Yugoslavia). Sternum VII and segment VIII, ♀, of (205) *C. turcicus* Jordan (topotype).



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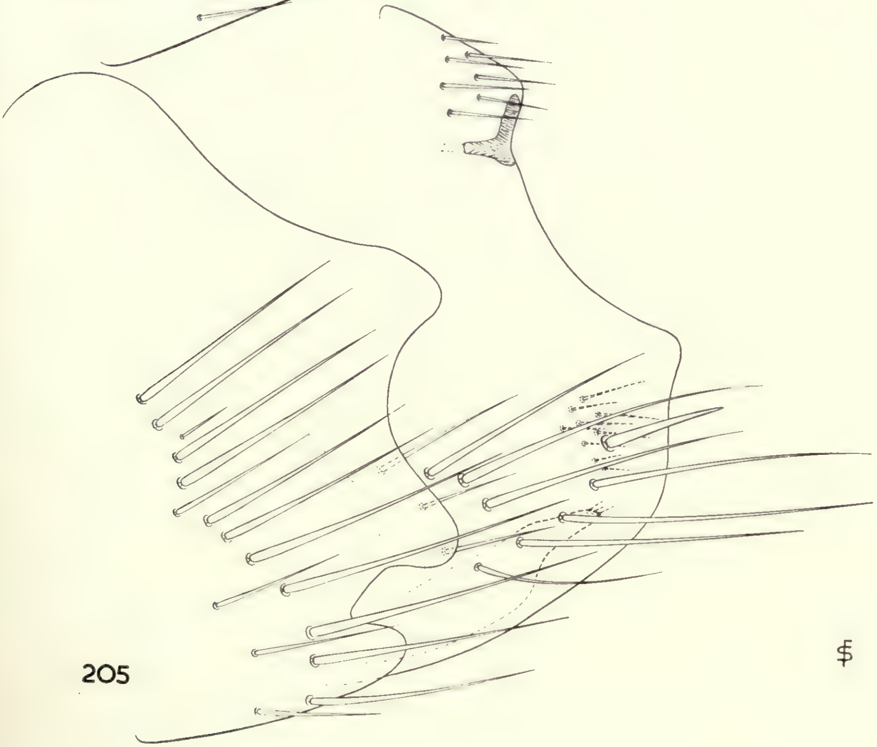

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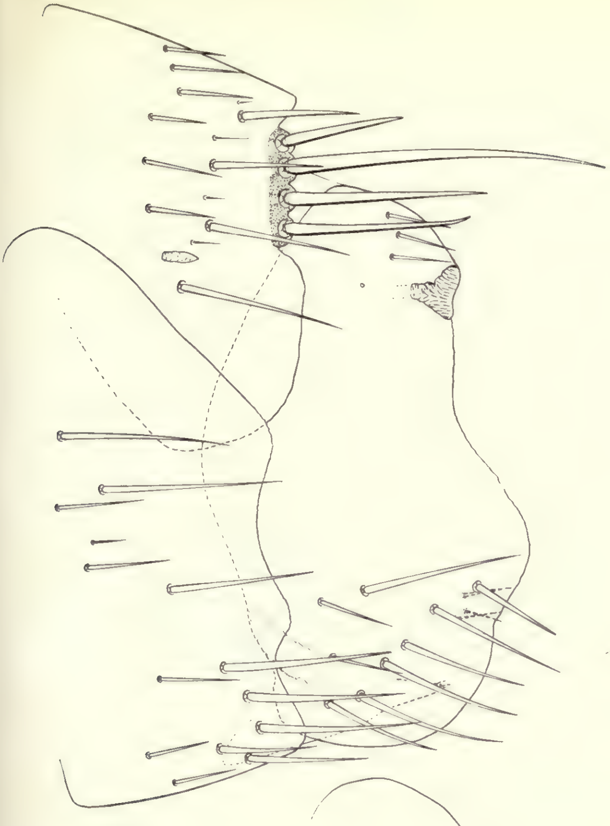
PLATE 56

Figs. 206–207. Segments VII and VIII, ♀, of (206) *Ctenophthalmus eximius* Jordan & Rothschild (Nakuru, Kenya). Sternum VII and segment VIII, ♀, of (207) *C. audax* Jordan & Rothschild (paratype).



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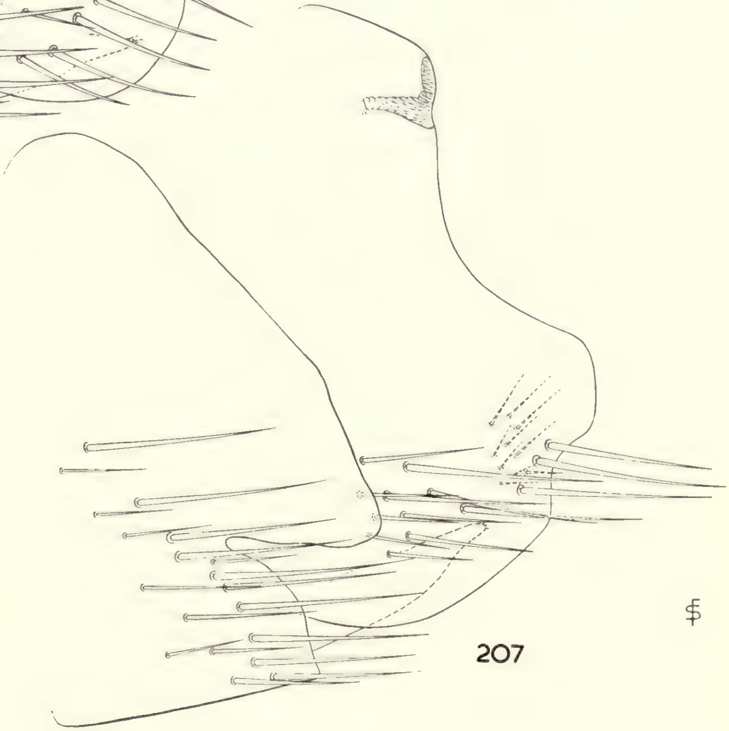

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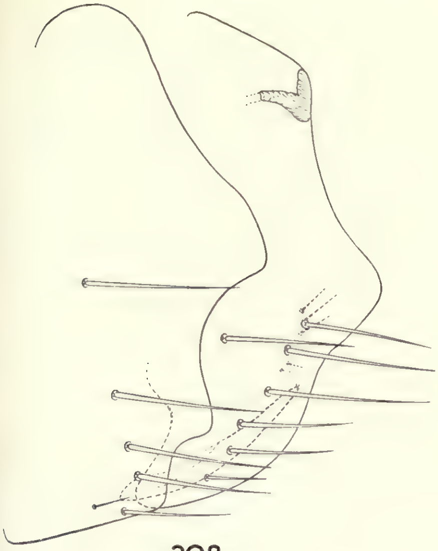
PLATE 57

Figs. 208–210. Sternum VII and segment VIII, ♀, of (208) *Ctenophthalmus parcus* Jordan (paratype). Sternum VII, segment VIII and spermatheca, ♀, of (209) *C. particularis* Berteaux (allotype). Sternum VII, segment VIII and genitalia, ♀, of (210) *C. acunus* Jordan (allotype).



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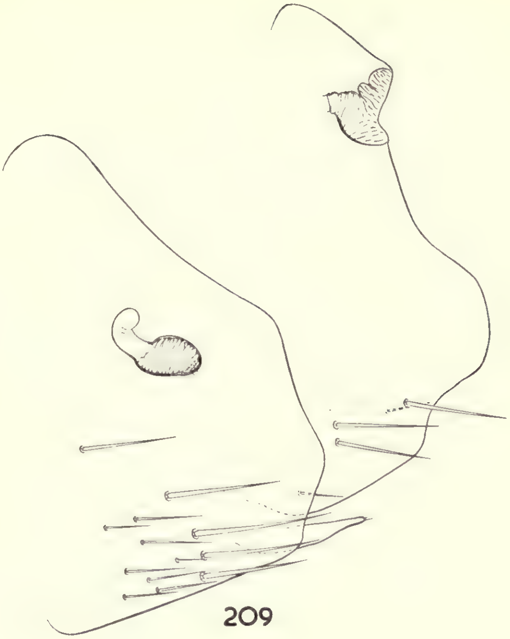

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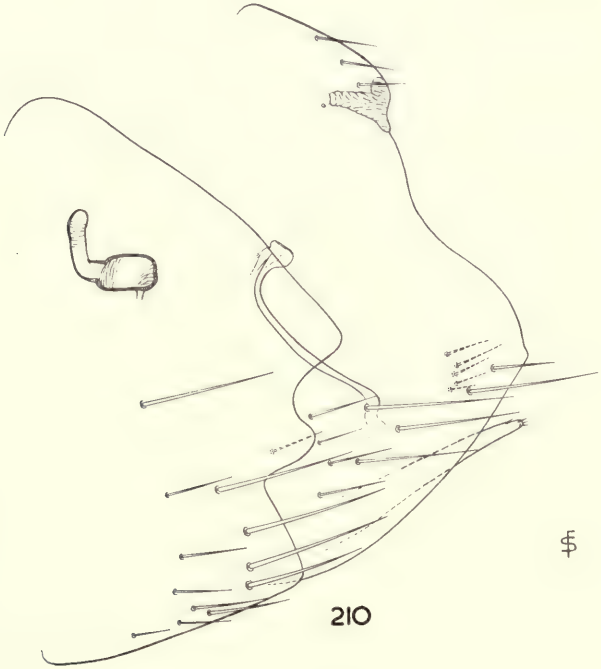

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PLATE 58

Figs. 211–212. Terminal abdominal segments and genitalia, ♀, of (211) *Ctenophthalmus ominosus* Smit (allotype). Genitalia of ♀ (212) *C. debrauwerei* Berteaux.

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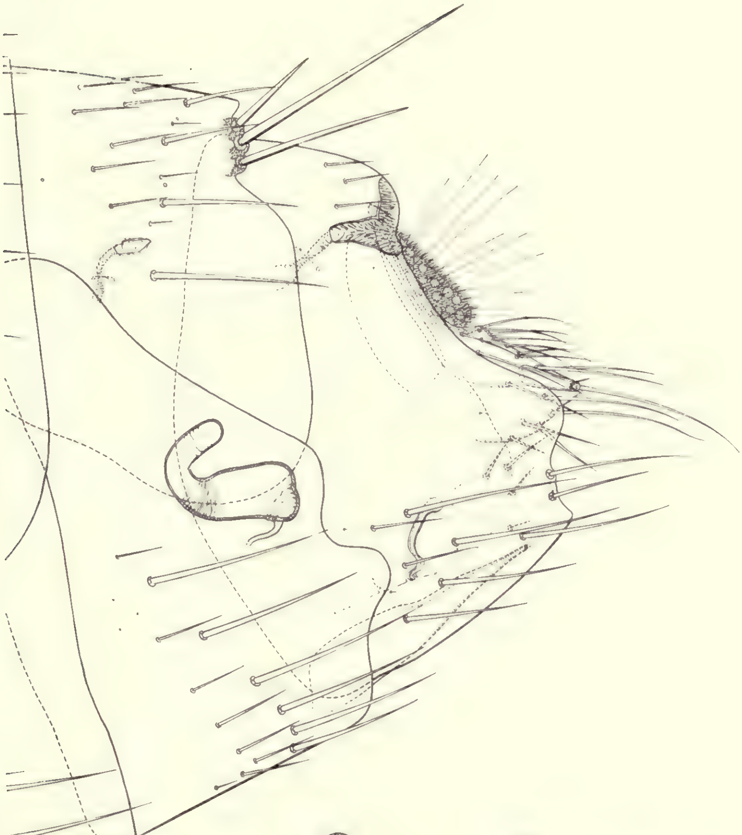

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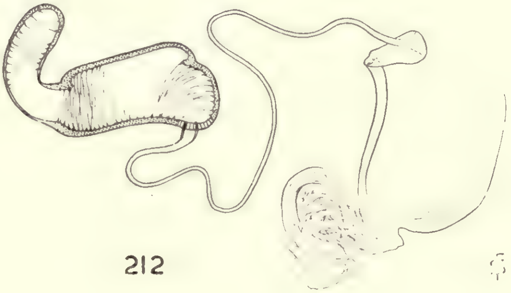

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A REVISION OF THE GENUS *DERETRICHIA* WEISE (COLEOPTERA : EUMOLPIDAE)

BRITISH MUSEUM
8 OCT 1963
NATURAL HISTORY

B. J. SELMAN

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ENTOMOLOGY Vol. 14 No. 4
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BY

B. J. SELMAN

Commonwealth Institute of Entomology, London

Pp. 153–196 ; 13 *Text-figures*

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A REVISION OF THE GENUS *DERETRICHIA* WEISE (COLEOPTERA : EUMOLPIDAE)

By B. J. SELMAN

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SYNOPSIS

The genus *Deretrichia* Weise is confined to the islands of S.W. Melanesia from the Molucca Islands to the Solomon Islands and Australia. Nineteen species are redescribed and twenty-two new species described and a key to the forty-one species prepared. Lectotypes have been selected wherever appropriate. The limits of the genus are redefined and its relationships discussed. The terminology and homologies of the prothorax within the Eumolpidae are discussed with particular reference to *Deretrichia*.

INTRODUCTION

THE little-known Australasian genus *Deretrichia* was erected in 1912 for the reception of six species which were transferred from the genus *Rhyparida* (Baly, 1861), a very large genus found throughout S.E. Asia and the Pacific. In this paper 22 new species of *Deretrichia* are described and 13 further species are transferred from the genus *Rhyparida*, making a total of 41 species. Ultimately the genus may be much larger than it is now. Of the original six species in the genus, five were described by Baly (1867), and one by Jacoby (1894). The material examined came from the collections of the British Museum (Nat. Hist.) and from the museums of Berlin-Dahlem, Genoa, Cambridge Massachusetts, Leyden and Paris, and comprised captures made by A. R. Wallace and C. Allen (1854–63) throughout the south-western Pacific islands including north-eastern Dutch New Guinea, W. Doherty (1892) in Dutch New Guinea and Tenember, F. Muir (1907) in Larat, L. M. Albertis (1872–75) in Australia and New Guinea, L. E. Cheesman (1934–36) and J. Schreurs (1961) in Dutch New Guinea, Loria (1892–95) in Papua, O. Baccari (1873) in Amboina, and Woodford (1887) in the Solomon Islands. Unfortunately in almost every locality the number of specimens collected was very small. Moreover, subsequent collecting in the same areas has seldom yielded further specimens. Although the reason for this is not known, the scarcity may be due to the subsequent clearance of coastal belts of forest. Wallace himself (1869) commented on the extreme paucity of insects in cleared areas and recently *Deretrichia* species have been collected only in regions, e.g. New Guinea, where large areas of the coastal forest belt have survived.

Because of the rarity of the species and the possibility that some may already have become extinct, it was decided to describe new species from unique specimens provided that these have good diagnostic characters.

DISTRIBUTION

The genus *Deretrichia* is found in Australia, New Guinea and the associated off-shore islands (Fig. 3). There are 20 species from the Molucca Islands, 15 from New Guinea including 10 from Dutch New Guinea and one species each from Timor, Larat, the Solomon Islands, Tasmania, Queensland and Borneo. No specimens have been found in Celebes in spite of the intensive collecting of A. R. Wallace and other later entomologists. The type locality of the species from Borneo, *D. laticollis* (Baly), is doubtful ; the locality labels are not the originals and no other specimens have been found west of the Molucca Islands. Therefore *Deretrichia*, with the doubtful exception of *D. laticollis*, is found only on the eastern side of Wallace's line ; that is in the Austro-Malayan region. In this it differs greatly from *Rhyparida*. The absence of species of *Deretrichia* in Celebes is unexpected, in view of the fact that numerous species have been collected from most of the larger islands between Celebes and New Guinea. The furthest east

TABLE I. Distribution list of *Deretrichia* from the Molucca Islands

	Batchian	Gilolo	Mysol	Ternate	Waigiou	Sula Isls.	Ceram	Amboina	Morty
D. alternata (Baly)	×	×	.	.	.	.	.	.	.
D. amboinensis*	.	.	.	.	.	.	.	×	.
D. approximata (Baly)	.	.	×	.	.	.	.	.	.
D. batchianica*	×	.	.	.	.	.	.	.	.
D. bipustulata (Baly)	.	.	.	.	×	.	.	.	.
D. brunnea (Baly)	×	.	.	.	.	.	.	.	.
D. bryanti*	.	×	.	.	.	.	.	.	.
D. flebilis*	.	.	.	×	.	.	.	.	.
D. giloloensis*	.	×	.	.	.	.	.	.	.
D. intermedia (Baly)	.	.	.	.	×	.	.	.	.
D. nigra*	.	×	.	.	.	.	.	.	.
D. pallidocaudata*	.	.	.	.	.	.	×	.	.
D. rothschildi (Jacoby)	.	×	.	.	.	.	.	.	.
D. ruginotum*	×	×	.	.	.	.	.	.	.
D. semipunctata (Baly)	×	.	.	.	.	.	.	.	.
D. separata (Baly)	×	.	.	.	.	.	.	.	.
D. sordida (Baly)	×	.	.	×	.	.	.	.	.
D. sulcicollis (Baly)	.	.	.	.	.	×	.	.	.
D. tibialis (Baly)	.	.	×	.	.	.	.	.	.
D. wallacei*	.	.	×	.	.	.	.	.	.

*signifies a new species.

that *Deretrichia* has been found is Guadalcanal in the Solomon Islands. Although only two species have been found in Australia, one in Tasmania and the other in Queensland, it is expected that many more species will be found there. It is likely that some species previously described in the genus *Rhyparida* will be transferred to the genus *Deretrichia*.

DERETRICHIA Weise

Deretrichia Weise, 1912 : 425.

Type species : *Deretrichia tibialis* (Baly, 1867) : 183.

Body approximately twice as long as broad, shining, glabrous. *Head* exserted, antennae elongate and filiform. *Thorax* transverse, pronotum with distinct lateral margins, posterior angles distinct and each armed with a seta, anterior margin rounded and lacking angles and

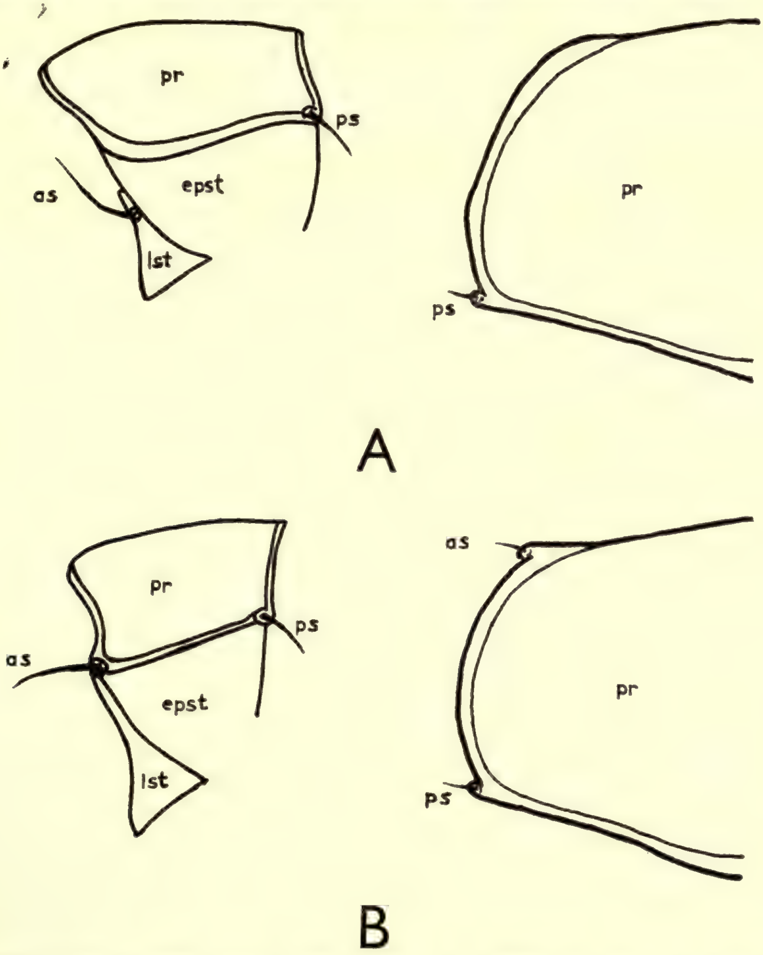

FIG. 1. Prothorax, lateral and dorsal view. A, *Deretrichia* sp. B, *Rhyparida* sp. pr. pronotum ; as. anterior seta ; ps. posterior seta ; epst. episternum ; lst. lateral arms of sternum.

setae, prothoracic sternites with a long seta at the junction of the antero-dorsal corner of the isolated lateral prolongations of the prosternum and the antero-ventral corner of the episternum (Text-figs. 1, 2) ; legs robust, femora usually with a tooth mid-way along the ventral surface, anterior tibiae often ridged and in the male, usually with a blunt tooth mid-way along the dorsal surface, middle and posterior tibiae strongly emarginate at the apex and usually ridged, tarsal claws bifid. *Scutellum* usually cordiform, approximately as broad as long. *Elytra* punctate-striate with the punctures obsolete at the apices.

The original diagnosis of the genus *Deretrichia* (Weise, 1912) was in the form of a short note stating the differentiating character : i.e. that in *Deretrichia* the anterior prothoracic setae are borne low down on the sides of the prothorax at the point where the corners of the episternum and the lateral prolongations of the sternum meet. In *Rhyparida* the setae are borne at the anterior corners of the pronotum. This has proved to be an excellent differentiating character (Text-fig. 1, A, B).

In *Nodostoma*, the only other genus with which *Deretrichia* might be confused, the thorax is almost identical with that of *Rhyparida*, and the anterior setae are borne at the anterior corners of the pronotum. Moreover, the tarsal claws are invariably appendiculate and never bifid as in *Deretrichia*.

NOTES ON THE TERMS USED

There are many terms for the head sclerite lying immediately anterior to the Y sutures of the head and posterior to the basal articulation of the labrum. In the Eumolpidae this sclerite is single, apparently originating from the fusion of the frons with the clypeus. This fused sclerite is called the fronto-clypeus (Text-fig. 4, A). The anterior edge of the fronto-clypeus is emarginate. The degree of emargination is a constant specific character and is expressed as a fraction of the circumference of a circle. For example, in Text-fig. 4, B the emargination forms a semicircle ; in Text-fig. 4, A, one quarter the circumference of a circle.

The region of the head posterior to the Y sutures is termed the epicranium and it is bisected longitudinally by the epicranial suture. In *Deretrichia*, the epicranial suture never extends to the back of the head and in a few cases is not continuous with the Y sutures. The length of the epicranial suture is measured by referring to an imaginary line drawn across the back of the eyes. In Text-fig. 4, A the epicranial suture extends to a point on a level with the back of the eyes.

Unfortunately much confusion exists over the terminology of the prothorax of the Eumolpidae. In the more primitive genera of the family, e.g. *Chiloscena*, *Macrolema*, *Spilopyra*, there is a simple broad sternum with long lateral arms as in the Halticidae (Text-fig. 2, A, B). In the majority of genera, the prothoracic coxae are far forward, touching or almost touching the extreme anterior border of the sternum, thus isolating the lateral arms of the sternum (Text-fig. 2, C, D) which have frequently been misnamed, e.g. episternum (Jacoby, 1908), pro-epimeron (Bechyné, 1957 a, b). Weise (1912) rightly described these sclerites as lateral prolongations of the sternum.

The examination of material from many other genera of Eumolpidae has shown that the setae normally associated with the antero-lateral corners of the pronotum may be situated anywhere along the anterior border of the episternum. In the

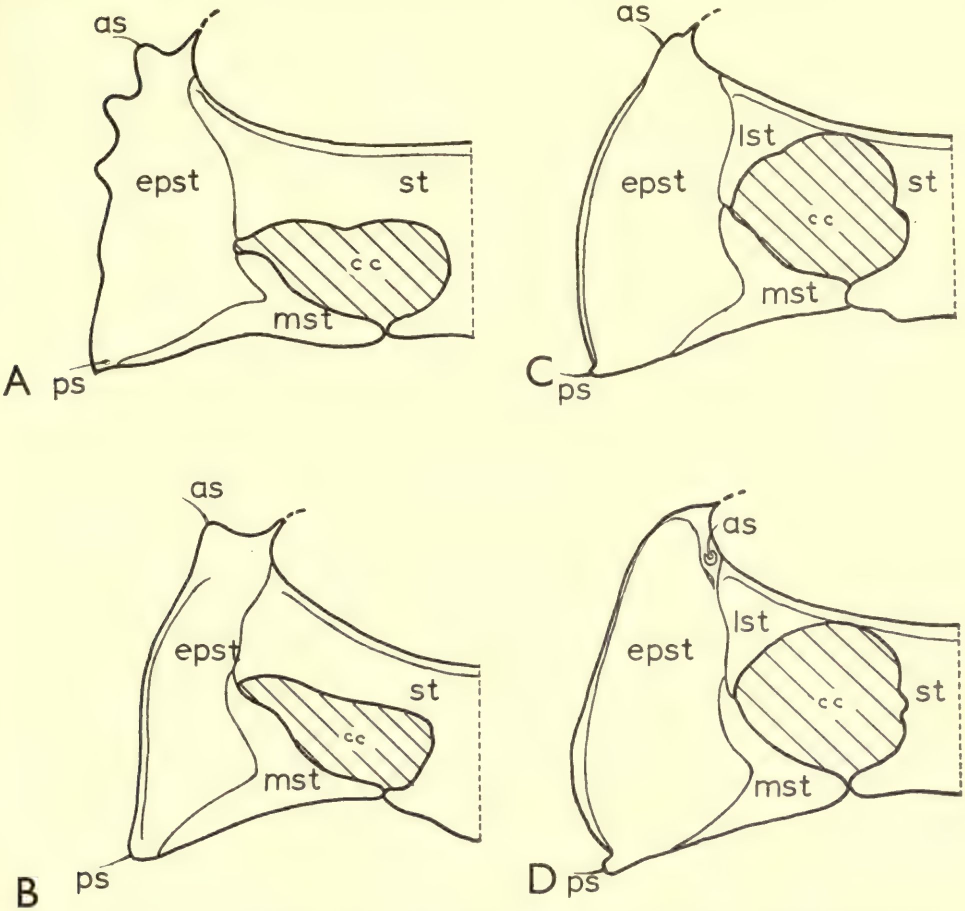

FIG. 2. Prothorax ventral view. A, *Cheiloscena* sp. B, *Spilopyra* sp. C, *Rhyparida* sp. D, *Deretrichia* sp. as. anterior seta ; ps. posterior seta ; st. sternum ; epst. episternum ; mst. mesosternum ; cc. coxal cavity ; lst. lateral arms of sternum.

genus *Deretrichia* the setae are in the most ventral position possible. The anterior border of the episternum, frequently thickened, may appear to be a prolongation of the dorso-anterior corner of the lateral arms of the prosternum. Indeed it has been claimed (Bechyné, 1957 a, b) that in some genera, e.g. *Typophorus*, the lateral arms (pro-epimeron of Bechyné) extend to the extreme latero-anterior surface of the pronotum where they form the base of the anterior setae. It is most unlikely that this is so. It seems that the anterior setae are always borne on the episternum and never on the lateral arms of the sternum nor on the pronotum.

The general surface of the insects varies from entirely smooth and shining to very finely but definitely granulated. This is a fine, more or less regular reticulation of impressed lines over the surface, a type of microsculpture referred to in this paper as shagreened.

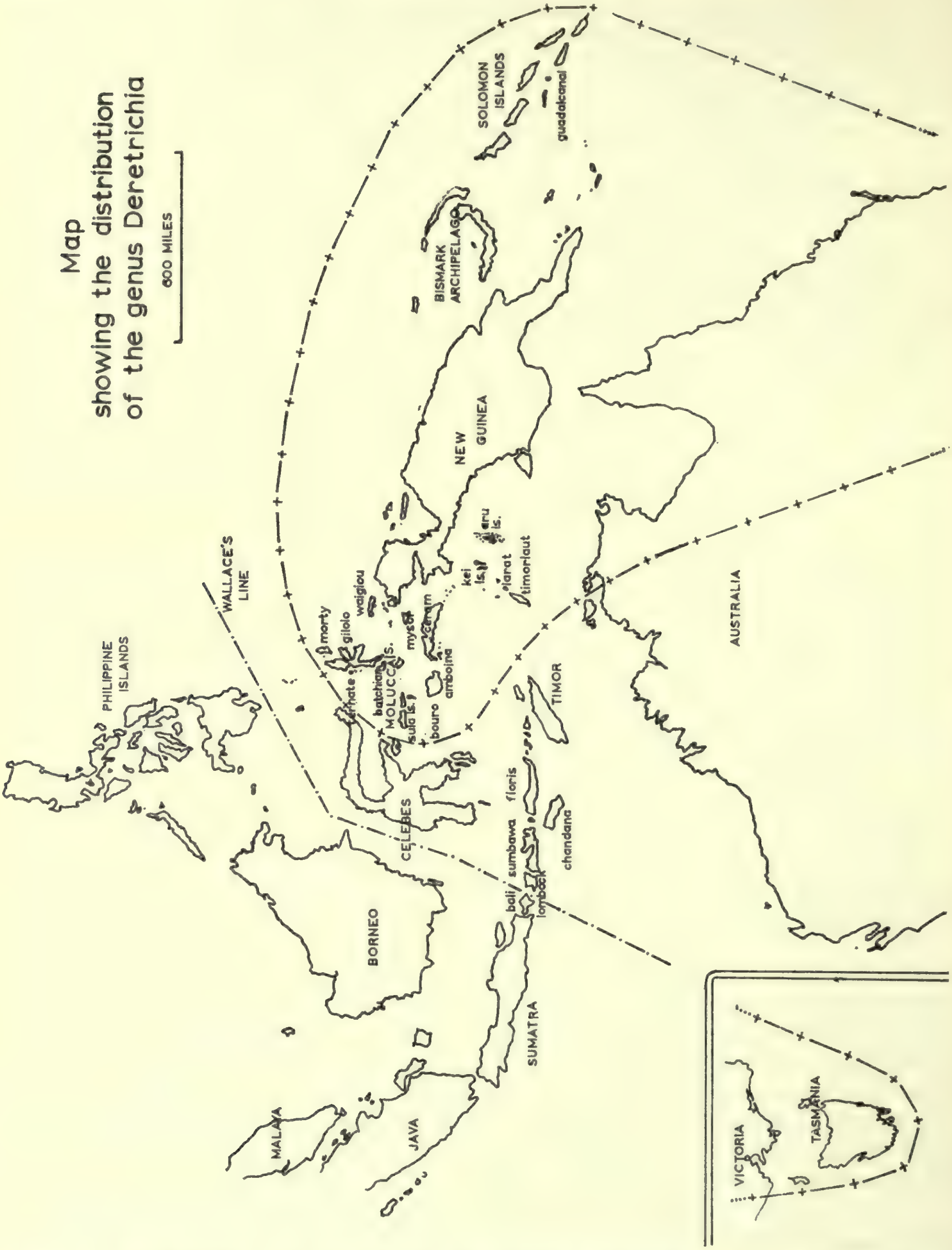
Map
showing the distribution
of the genus Deretrichia
600 MILES
SOLOMON ISLANDS
guadalcanal
BISMARK ARCHIPELAGO
NEW GUINEA
aru Is.
kei Is.
larat
timorlaut
WALLACE'S LINE
PHILIPPINE ISLANDS
morty
gilolo
waigiou
mysol
ceram
MOLUCCA IS.
ternate
batchian
sula Is.
bouro
amboina
TIMOR
AUSTRALIA
CELEBES
floris
sumbawa
chandana
bali
lombock
BORNEO
SUMATRA
MALAYA
JAVA
TASMANIA
VICTORIA

FIG. 3. Map showing the distribution of the genus *Deretrichia*. +——+ marks the boundary of the area within which *Deretrichia* species are to be found.

KEY TO THE SPECIES OF *Deretrichia*

1	Thorax and elytra of different colours	2
–	Thorax and elytra of same general colour	3
2	Thorax black, elytra with coloured sheen	20
–	Not as above	4
3	At least some pronotal punctures elongated particularly along anterior and/or lateral edges	5
–	Pronotal punctures not elongate	6
4	Elytra unicolorous	7
–	Elytra with a pair of red spots	22
5	Interstices of pronotum raised	23
–	Interstices of pronotum not raised	8
6	Longer than 5·5 mm.	31
–	Between 3·3 and 5·5 mm.	9
–	Shorter than 3·3 mm.	***minuta*** sp. n. (p. 164)
7	Longer than 5 mm.	38
–	Shorter than 5 mm.	39
8	Frontoclypeus sides approximately straight and diverging 8° or more from the median line	12
–	Frontoclypeus sides parallel or diverging by less than 8°	13
9	Punctures on frontoclypeus large and distinct	10
–	Punctures on frontoclypeus not large and distinct	11
10	4·5 mm. or more in length	24
–	4·0 mm. or less in length	17
11	Shorter than 3·75 mm.	25
–	Longer than 3·75 mm.	18
12	Longer than 7 mm. Pronotum approximately rectangular with undulating sides	***morokensis*** sp. n. (p. 165)
–	Longer than 4 mm. but less than 6 mm.	***amboinensis*** sp. n. (p. 165)
–	Shorter than 4 mm.	32
13	Punctation of pronotum minute and slit-like	***andannensis*** (Jacoby) (p. 168)
–	Punctation of pronotum not minute and slit-like	14
14	5 mm. or more in length	***laticollis*** (Baly) (p. 168)
–	Less than 5 mm. in length	15
15	Epicranial suture extends back to a point on a level with the back of the eyes	16
–	Epicranial suture clearly extending to a point behind the level of the back of the eyes	19
16	Emargination of frontoclypeus forming less than one quarter circumference of a circle	36
–	Emargination of frontoclypeus forming one quarter or more of circumference of a circle	37
17	Pronotum lightly punctured, interstices very shiny, elytra elongate	***papuensis*** sp. n. (p. 169)
–	Pronotum heavily punctured, elytra not elongate	***inornata*** (Jacoby) (p. 169)
18	Epicranial suture extends to a point on a level with the back of the eyes	28
–	Epicranial suture clearly extending to a point behind the level of the back of the eyes	30
19	Pronotum strongly narrowing towards the base, Text-fig. 12B, elytra with humeral sulcus deep	***tibialis*** (Baly) (p. 170)
–	Pronotum not strongly narrowing towards the base, Text-fig. 13J, elytra with humeral sulcus shallow	34
20	Thorax as broad as or broader than elytra	***nigronotata*** sp. n. (p. 171)
–	Thorax not as broad as elytra	21
21	Frontoclypeus with sides diverging at least 8°, epicranial suture extending to a point well behind the level of the back of the eyes, emargination of frontoclypeus forming one sixth of a circle	***livida*** sp. n. (p. 171)

– Frontoclypeus with sides approximately parallel, epicranial suture extending to a point level with the back of the eyes, emargination of frontoclypeus forming one quarter of a circle . . . . ***viridis*** sp. n. (p. 172)
22 Sheen on thorax purple, emargination of frontoclypeus forming one eighth of a circle ***paumomuensis*** sp. n. (p. 172)
– Sheen on thorax green, emargination of frontoclypeus forming one fifth of a circle ***bipustulata*** (Baly) (p. 173)
23 Elytra and thorax flavous . . . . . . ***guadalcanalensis*** sp. n. (p. 174)
– Elytra and thorax mid- to dark brown . . . . ***ruginotum*** sp. n. (p. 175)
– Elytra and thorax very dark brown or black . . . ***sordida*** (Baly) (p. 175)
24 Colour dark brown or black 29
– Colour light brown or flavous . . . . . . ***doryensis*** sp. n. (p. 176)
25 Pronotum not strongly narrowed anteriorly, Text-fig. 12T, margins undulating ***timorensis*** (Jacoby) (p. 177)
– Pronotum strongly narrowed anteriorly 26
26 Pronotum with a transverse chevron-shaped depression just posterior to the anterior border . . . . ***sulcicollis*** (Baly) (p. 177)
– Pronotum without transverse depression 27
27 Colour very dark brown, almost black, humeral sulcus well developed ***pinguis*** sp. n. (p. 179)
– Colour medium brown, humeral sulcus poorly developed . . ***nigra*** sp. n. (p. 179)
28 Pronotum strongly narrowed anteriorly, Text-fig. 13B, sutures between frontoclypeus and epicranium indistinct, colour light brown . . ***batchianica*** sp. n. (p. 180)
– Pronotum only a little narrowed anteriorly, Text-fig. 13F, sutures between frontoclypeus and epicranium most distinct, colour dark brown ***pallidocaudata*** sp. n. (p. 180)
29 Epicranium chestnut red, frontoclypeus and pronotum dark brown ***approximata*** (Baly) (p. 182)
– Epicranium dark brown as the pronotum or only a very little lighter ***plebeja*** (Jacoby) (p. 182)
30 Lateral margins of pronotum evenly rounded and strongly narrowed posteriorly with an indistinct, chevron-shaped depression just posterior to the anterior border, interstices strongly granulate, colour dark brown . . ***brunnea*** (Baly) (p. 183)
– Pronotum strongly narrowed posteriorly from a point one third of the way from the base, without a chevron-shaped depression, interstices shining but only very slightly granulate, colour very dark brown, almost black . ***plebeja*** (Jacoby) (p. 182)
31 Pronotum strongly narrowed towards base, Text-fig. 13E, emargination of frontoclypeus forming one fifth circumference of circle . ***intermedia*** (Baly) (p. 184)
– Pronotum not strongly narrowed towards the base, Text-fig. 12D 35
32 Shorter than 3 mm., pronotal punctures sparse and very elongate ***rothschildi*** (Jacoby) (p. 184)
– Longer than 3 mm. 33
33 Pronotum highly convex, strongly narrowed at the base, colour light brown ***australis*** sp. n. (p. 186)
– Pronotum sides evenly curved but not narrowed at base, body very broad, colour dark brown . . . . ***cyclopensis*** sp. n. (p. 186)
34 Scutellum much broader than long, pronotum Text-fig. 13I, colour dark brown, legs, head and apices of elytra light brown . . . ***bryanti*** sp. n. (p. 187)
– Scutellum only a little broader than long, pronotum Text-fig. 13J, colour black, legs, head and distal tips of elytra light brown . . . ***frontalis*** (Baly) (p. 187)
35 Legs, head and body black, sides of frontoclypeus parallel . ***laticollis*** (Baly) (p. 168)
– Legs, head and body chestnut brown, pronotum and elytra with varying amounts of chestnut brown, sides of frontoclypeus diverging . . . ***hincksi*** sp. n. (p. 189)

36 Pronotum Text-fig. 13H, longer than 4 mm. . . . . . **wallacei** sp. n. (p. 189)
– Pronotum Text-fig. 12N, shorter than 4 mm. . . . . . **nigra** sp. n. (p. 179)
37 Pronotum Text-fig. 13K, with a very shallow chevron-shaped depression just behind the anterior edge, basal area of elytra almost impunctate . **laevifrons** (Jacoby) (p. 190)
– Pronotum Text-fig. 13R, without a depression, basal area of elytra heavily punctate **giloloensis** sp. n. (p. 191)
38 Thorax chestnut red, elytra black, spermatheca Text-fig. 11D **alternata** (Baly) (p. 191)
– Thorax brownish yellow, elytra dark brown, spermatheca Text-fig. 11E **flebilis** sp. n. (p. 193)
39 Spermatheca Text-fig. 11C, basal area of elytra much raised, transverse depression with deeply impressed punctures . . . . . . **separata** (Baly) (p. 194)
– Spermatheca Text-fig. 11G, basal area less raised, transverse depression with punctures less impressed . . . . **semipunctata** (Baly) (p. 194)

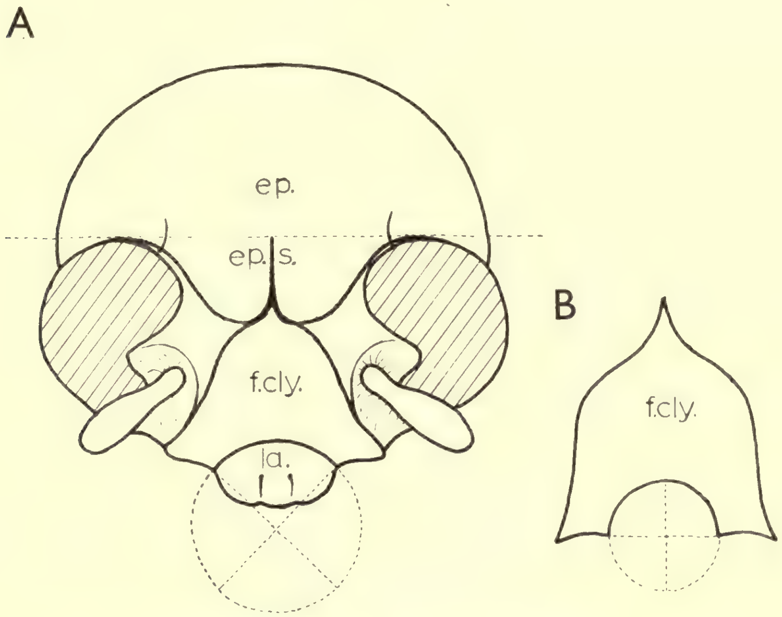

FIG. 4. Diagram of dorsal surface of head, showing the method of assessing the degree of emargination of the frontoclypeus. ep. epicranium ; ep.s. epicranial suture ; f.cly. frontoclypeus ; la. labrum. For further explanation see p. 5.

LOCATIONS AND DESIGNATION OF TYPES

Unless otherwise stated the holotypes are in the British Museum (Nat. Hist.). Baly and Jacoby, who described many of the species discussed in this paper, did not select holotypes. Therefore wherever possible lectotypes have been selected from the syntype series. All the lectotypes in this paper have been selected by the author. In a few species where it has not been possible to obtain fully authenticated type material, an asterisk is placed beside the name.

DESCRIPTIONS

Deretrichia minuta sp. n.

(Text-figs. 5, 10A, 12P)

♀ *Length* 3·2 mm. *Colour* very dark brown, appendages lighter. *Head* shagreened, epicranium with many shallow indistinct punctures, an epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus vestigial, frontoclypeus with many shallow punctures only a little more distinct than those on the epicranium, sides approximately parallel, anterior edge emarginate, emargination forming one sixth of the circumference of a circle, antennae short, reaching one quarter of the way down the elytra, 2nd segment short, 1st longer than 2nd and approximately equal to 5th–11th segments, 4th longer than 1st, 3rd longer than 4th. *Thorax* (Text-fig. 12P) 1·4 × 0·9 mm., pronotum relatively flat, narrowly margined, surface closely covered with small punctures, interstices obscurely shagreened ; femora with a ventral tooth one third from the distal tip, tibiae ridged. *Scutellum* cordiform with a flat base, impunctate, shagreened. *Elytra* × 2·1 as long as thorax, broader than thorax, humerus and thorax only very slightly raised, transverse depression very shallow but clearly discernible, humeral sulcus vestigial, punctures small, sparse and shallow, vestigial on the basal area and towards the apex. Genitalia, female, Text-fig. 10A.

Holotype : female, " TASMANIA, Somerset, i. 1875 " (*L. M. Albertis*), Museo Civico, Genoa.

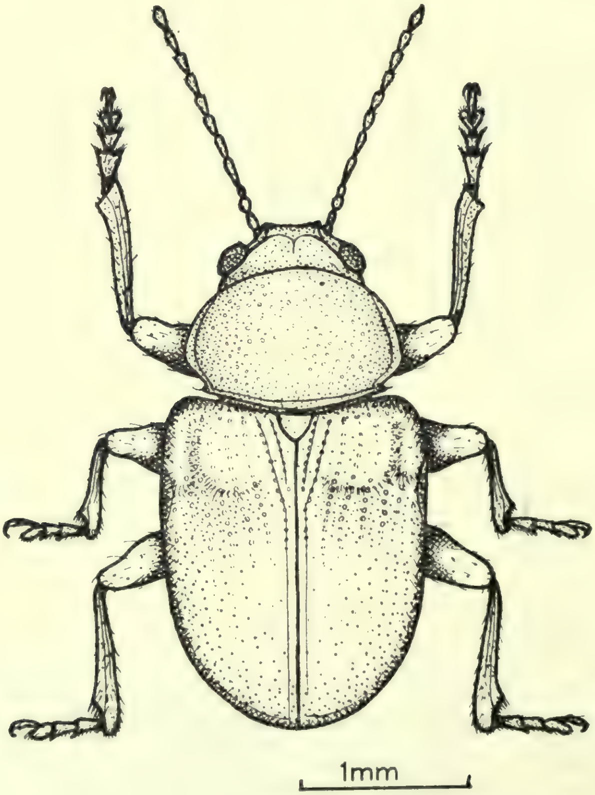

FIG. 5. *Deretrichia minuta* n. sp. ♀.

This species and *D. australis* are the first species of *Deretrichia* described from Australia. *D. minuta* may be distinguished from *D. australis* by the elongated pronotal punctures, flatter pronotum and darker colour.

Deretrichia morokensis **sp. n.**

(Text-figs. 6, 10B, 12A)

♀ *Length* 8·0 mm. *Colour* dark chestnut brown, thorax and head darker, antennae and labrum lighter. *Head* heavily shagreened, epicranium heavily punctured and strongly raised, the punctures large and deep, many with confluent depressions forming diagonally elongated channels extending from mid-anterior to latero-posterior, an epicranial suture extending to a point almost level with the back of the eyes, sutures between epicranium and frontoclypeus very prominent, frontoclypeus twice as wide as long at the anterior end, sides diverging very strongly anteriorly, anterior edge emarginate, emargination forming one quarter of the circumference of a circle, antennae reaching one third of the way down the elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 4th–11th approximately equal and each longer than 1st. *Thorax* (Text-fig. 12A) 3·0 × 1·9 mm., pronotum much more rectangular than in most species, strongly margined, margin indented and buckled, punctures large and scattered, elongated along a postero-median to antero-lateral line, the mid-anterior edge ridged in a longitudinal direction, interstices smooth and glabrous ; tibiae strongly ridged, femora very lightly shagreened but lacking the usual surface rugosities, 1st and 2nd tarsal segments with latero-distal points produced and very acute, claw segment equal in length to the other tarsal segments together. *Scutellum* cordiform, almost quadrate, glabrous with scattered small punctures. *Elytra* × 3·1 as long as thorax, basal area and humerus raised and bounded behind by a transverse depression, punctures very large and deep especially within the transverse depression, the humeral sulcus, and along the sides to the apex, slightly reduced on the basal area and the postero-median region, interstices glabrous with minute punctures, ridged immediately behind the humerus. Genitalia, female, Text-fig. 10B.

Holotype : female, " S.E. NEW GUINEA, Moroka, 1,300 m. vii–xi.1895 (*Loria*), Museo Civico, Genoa ".

This unique species is characterized by the very long elytra, a very rectangular pronotum with indented and buckled margins (Text-fig. 6, 12A), the large elytral punctures especially along the sides, and the lack of femoral spines.

Deretrichia amboinensis **sp. n.**

(Text-figs. 7, 9A, 12C)

♂ *Length* 4·3 mm. *Colour* dark brown, with head, underside of thorax, abdomen, legs and apex of elytra paler, head appendages flavous. *Head* granulate, epicranium with a few minute shallow and very indistinct punctures, a short epicranial suture extending to a point just anterior to the back of the eyes, sutures between the frontoclypeus and epicranium very distinct, frontoclypeus with a few shallow indistinct punctures, sides diverging anteriorly, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching just over halfway down the elytra, 2nd segment short, 3rd longer than 2nd, 4th longer than 3rd, 1st approximately equal to 4th–11th. *Thorax* (Text-fig. 12C) 1·1 × 1·9 mm., pronotum strongly margined, sides unevenly rounded, surface lightly shagreened, closely punctured with small but very distinct punctures, becoming vestigial around the circumference, elongate along the longitudinal axis ; tibiae strongly ridged with a prominent blunt spine on the dorsal surface just over one third of the way from the base to the apex, hind and middle tibiae very strongly emarginate, femora with a very small blunt tooth on the ventral surface. *Scutellum* cordiform with a flat base, glabrous with a few minute indistinct punctures. *Elytra* ×2·5 as long as thorax, broader than thorax, humerus and basal area prominently raised and bounded behind by a distinct transverse depression, humeral sulcus deep, punctures large and prominent within the transverse depression and humeral sulcus, reduced on the middle of the elytra and vestigial on the apical quarter and on the basal area and humerus. Genitalia, male, Text-fig. 9A.

Holotype : male, " AMBOINA, 1873 (*O. Beccari*), Museo Civico, Genoa ".

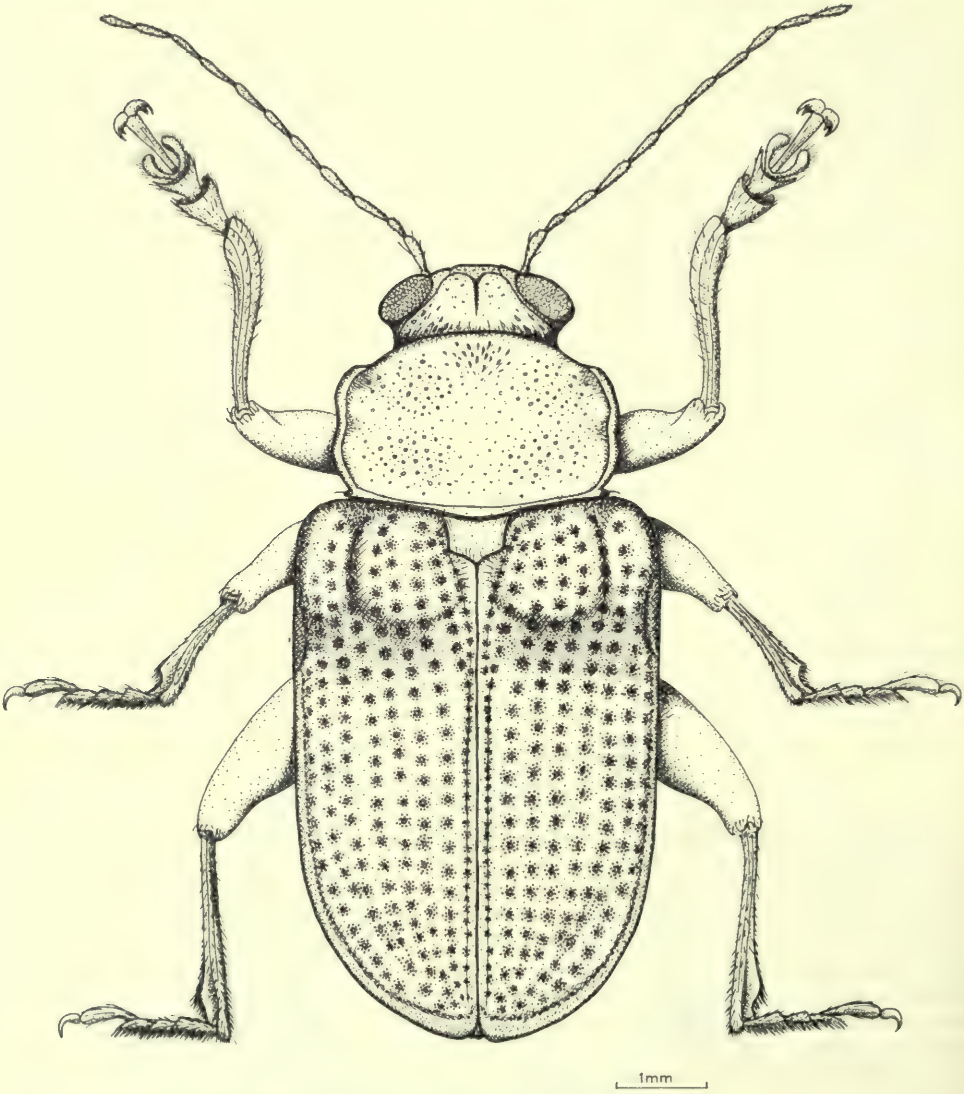

FIG. 6. *Deretrichia morokensis* sp. n. ♀.

This very distinctive species is long in proportion to its width, with long slender legs and antennae. The very distinctive aedeagus has a longitudinally-divided terminal lobe.

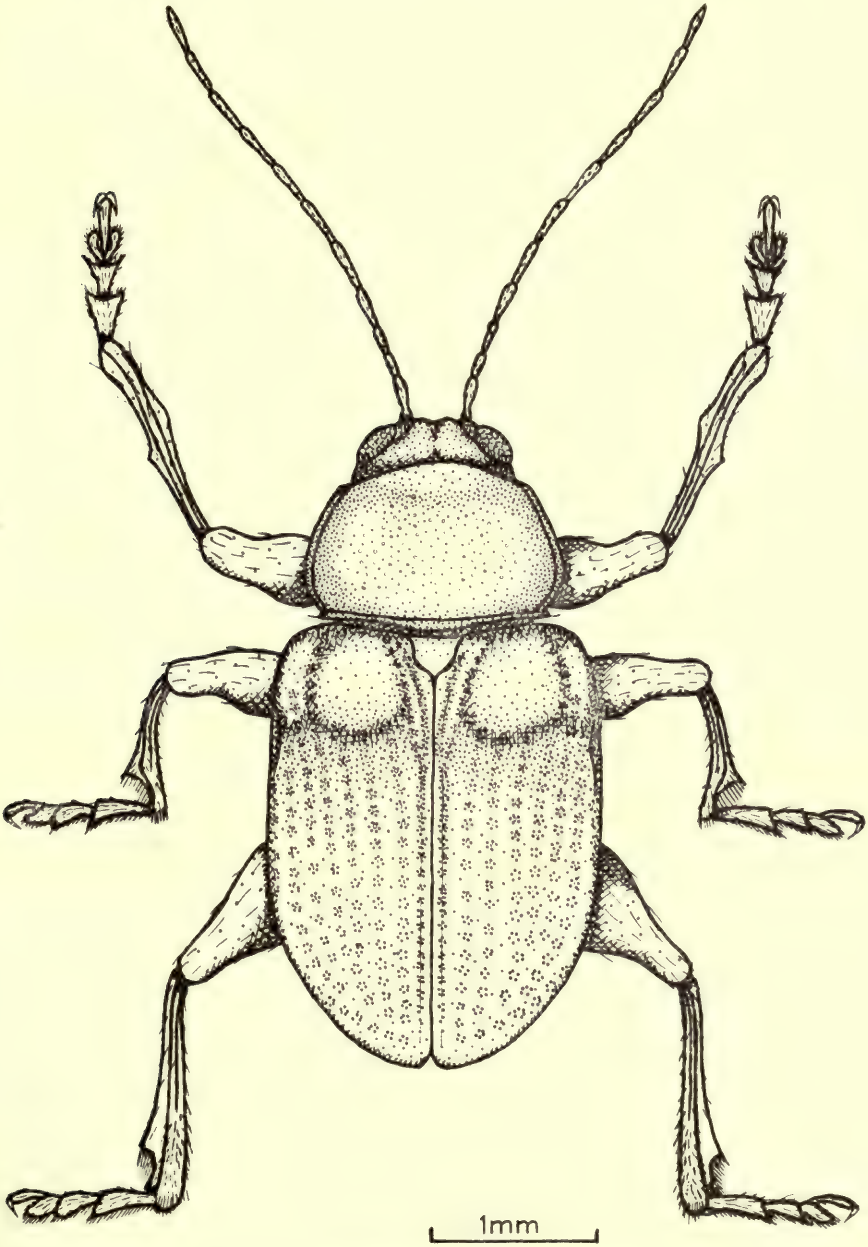

FIG. 7. *Deretrichia amboinensis* sp. n. ♂.

Deretrichia andannensis (Jacoby) **comb. n.**

(Text-figs. 9B, 10C, 12F)

Rhyparida andannensis Jacoby, 1894 : 280.

♂ ♀ *Length* 3·8 mm. *Colour* unicolorous testaceous, some specimens with darker areas on the elytra and thorax, mandibles dark brown, other head appendages fulvous. *Head* shagreened, epicranium very minutely and indistinctly punctured, a short distinct epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus present but not very distinct, frontoclypeus scarcely longer than broad, minutely but indistinctly punctured, sides diverging from posterior to anterior, anterior edge emarginate, emargination forming one quarter of the circumference of a circle, antennae reaching more than halfway down the elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 4th–11th equal and each longer than 3rd. *Thorax* (Text-fig. 12F) 1·9 × 1·0 mm., pronotum very distinctly punctured with small, slightly longitudinally-elongated punctures, interstices glabrous but shagreened, sides margined, rounded, converging from one third of the way from the base to the apex, a very shallow, indistinct, chevron-shaped, transverse depression just behind the anterior border ; femora with a small tooth on the ventral surface one third of the way from the apex, tibiae ridged in the female, in the male thickened and more heavily ridged. *Scutellum* cordiform with a flat base and extended shoulders, shagreened, impunctate. *Elytra* × 2·5 as long as thorax, broader than thorax, glabrous, the basal area raised and bounded by a transverse depression, humeri prominent, punctures large and distinct especially within the transverse depression and humeral sulcus, reduced on the basal area and becoming vestigial on the posterior half, the apex impunctate. Genitalia, female, Text-fig. 10C ; male, Text-fig. 9B.

Lectotype : female, " NEW GUINEA, Andai, 1892 (*W. Doherty*) ". By present selection.

Other material : two males and four females, NEW GUINEA, " Dory ", iv–vi.1858 (*A. R. Wallace*), of which one female and one male are in the British Museum (Nat. Hist.), and the remainder in the Manchester Museum.

This species is similar to *D. pinguis*, and may be distinguished by the slit-like pronotal punctures and dull pronotum.

Deretrichia laticollis (Baly) **comb. n.**

(Text-fig. 12D)

Rhyparida laticollis Baly, 1867 : 182.

♀ *Length* 6·3 mm. *Colour* black, legs very dark brown, almost black. *Head* heavily shagreened, epicranium heavily and distinctly punctate, an epicranial suture extending to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus broader than long, deeply and closely punctate, sides diverging slightly anteriorly, anterior edge emarginate, emargination forming three sixteenths of the circumference of a circle, antennae with 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th and 5th approximately equal and longer than 3rd, segments 6–11 missing. *Thorax* (Text-fig. 12D) 3·2 × 1·8 mm., pronotum heavily punctate, interstices glabrous and minutely shagreened, sides smoothly rounded, broadly margined ; legs stout, tibiae ridged, femora with a small blunt tooth on the ventral surface one quarter from the distal end. *Scutellum* cordiform with a flat base, glabrous with a few minute scattered punctures. *Elytra* × 2·22 as long as thorax, just broader than thorax, heavily punctate, interstices minutely punctured, slightly but distinctly convex on the anterior half, punctures deep within the transverse groove and humeral sulcus, less so on the basal area and posterior half, becoming vestigial towards the apex, basal area and humeri raised, transverse depression and humeral sulci distinct. Genitalia missing.

Lectotype : female, " BORNEO ", date and collector unknown, from the Baly collection. By present selection.

This is the only species of *Deretrichia* so far described from Borneo. The lectotype bears only Baly labels although it was included in the description of the material collected by A. R. Wallace in Melanesia. There is some doubt about the validity of the type locality. *D. laticollis* is similar to *D. plebeja*, but is much larger with larger punctures on the pronotum and the elytra.

***Deretrichia papuensis* sp. n.**

(Text-fig. 12K)

♀ *Length* 4·0 mm. *Colour* unicolorous light brown, punctures on elytra dark brown. *Head* shagreened, with a few minute, indistinct punctures, a deep epicranial suture extending back to a point on a level with the back of the eyes, sutures between frontoclypeus and epicranium very distinct, frontoclypeus heavily punctate, sides almost parallel, anterior edge emarginate, emargination forming one quarter of the circumference of a circle, antennae reaching halfway down elytra, segments 6–11 broader than 1–5, 2nd short, 1st equal to 3rd and longer than 2nd, 4th–11th approximately equal and just longer than 3rd. *Thorax* (Text-fig. 12K) 1·1 × 2·1mm, sides smoothly rounded with a broad margin, surface smooth and glabrous with numerous small, distinct punctures ; femora with a blunt tooth on the mid-ventral surface, tibiae ridged, male unknown. *Scutellum* wider than long, semi-ovate, glabrous, smooth and impunctate. *Elytra* × 2·6 as long as thorax, just broader than thorax, elongate, basal area and humerus only slightly raised, transverse depression present but ill-defined and very shallow, punctation bold within the transverse depression, reduced on the basal area and vestigial at the apex, interstices smooth and glabrous. Genitalia missing.

Holotype : female, " PAPUA, Mafulu, 4,000 ft., Jan. 1934 (*L. E. Cheesman*) ".

This species is unique in the degree of elytral elongation and in the slight flattening of the elytra and abdomen.

***Deretrichia inornata* (Jacoby), comb. n.**

(Text-figs. 10L, 12R)

♀ ***Rhyparida inornata*** Jacoby, 1894 : 278.

Length 3·1–3·8 mm. *Colour* mid-brown, some specimens with darker patches on the head and pronotum. *Head* shagreened, epicranium with numerous distinct but shallow punctures, an epicranial suture extending back to a point just behind the level of the back of the eyes, sutures between the epicranium and frontoclypeus distinct, frontoclypeus heavily punctate, sides approximately parallel, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching halfway down the elytra, 1st segment approximatley equal to each of segments 5th–11th, 2nd shorter, 3rd longer than 2nd but shorter than 1st, 4th longer than 1st. *Thorax* (Text-fig. 12R) 1·1 × 1·9 to 0·9 × 1·6 mm., pronotum glabrous, very heavily punctate, interstices very lightly shagreened, sides smoothly rounded with no suggestion of an angle, margin narrow ; tibiae of female ridged, femora with a minute blunt tooth on the ventral surface one quarter of the way from the distal end, male unknown. *Scutellum* cordiform, glabrous, very lightly shagreened with numerous small punctures mostly on the anterior half. *Elytra* × 2·4 as long as pronotum, humerus and basal area slightly raised and bounded below by a shallow broad transverse depression, punctures shallow but prominent on the posterior half of the elytra, deepest within the transverse depression and humeral sulcus, becoming indistinct towards the apex, interstices smooth and glabrous. Genitalia, female, Text-fig. 10L.

Lectotype : female, " TENIMBER, vi–vii. 1892 (*W. Doherty*) ", in the Bowditch collection of the Museum of Comparative Zoology, Harvard. By present selection. This is the left hand specimen of two females mounted on the same card " (Type No. 9817) ".

Paralectotype : female, data as above. By present selection. This is the right hand specimen of the two females mounted on the same card " (Type No. 9817) ".

Other specimens : two females, " LARAT, 1907 (*F. Muir*) ", in the British Museum (Nat. Hist.).

This very distinct species is closest to *D. pinguis*, and *D. timorensis*. It is readily distinguishable from *D. pinguis* by the much heavier punctation of the pronotum, elytra, scutellum and frontoclypeus ; and from *D. timorensis* by the much heavier punctation of the frontoclypeus and the more evenly rounded shape of the pronotum.

Deretrichia tibialis (Baly)*

(Text-figs. 9C, 11F, 12B)

Rhyparida tibialis Baly, 1867 : 183.
Deretrichia tibialis (Baly) Weise, 1912 : 425.

♂ ♀ *Length* 4·25–4·5 mm. *Colour* variable, some specimens reddish-brown, legs and epipleura lighter and more flavous, head appendages flavous ; other specimens with thorax very dark brown, with the anterior edge light brown, epicranium reddish-brown, frontoclypeus reddish-brown or dark brown, elytra dark brown with apex and anterior edge pale, scutellum also pale, abdomen dark brown, legs and head appendages as in the type ; many intermediate specimens, but all having a reddish-brown epicranium. *Head* shagreened, epicranium with small, indistinct punctures, a short epicranial suture extending to a point just behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus as wide as long, distinctly punctate, interstices shagreened, sides approximately parallel, anterior edge concave and emarginate, emargination forming one third of the circumference of a circle, antennae reaching two thirds of the way down the elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 4th longer than 3rd, 5th–11th approximately equal but each shorter than 4th. *Thorax* (Text-fig. 12B) of male 1·3 × 2·35, of female 1·2 × 2·25 mm, pronotum heavily margined, sides smoothly curved, strongly convex both longitudinally and transversely, lightly shagreened with numerous distinct, longitudinally elongated punctures, median anterior edge slightly raised giving a hooded effect ; tibiae ridged, male with a conspicuous blunt tooth on the dorsal surface one third of the way from the proximal end, 2nd segment of the tarsi with latero-distal points produced, those of the 1st segment much less so, femora with a well-developed blunt tooth on the ventral surface three-eighths of the distance from the distal end, less well-developed on the meso- and meta-thoracic legs. *Scutellum* cordiform with a flat base, glabrous, lightly shagreened, impunctate. *Elytra* of male approximately × 2·18, and of female × 2·36 as long as thorax, those of male equal in width to thorax, those of female wider than thorax, basal area little raised, transverse depression and humeral sulcus vestigial, humeri prominent, punctation large and prominent, interstices smooth, glabrous and very slightly raised. Genitalia, male Text-fig. 9C ; female Text-fig. 11F.

One male and three females, " MYSOL ", 1860 (*A. R. Wallace*), in the British Museum (Nat. Hist.).

This species is the type of the genus. Unfortunately the present author has been unable to find the type of the species. However, one specimen of the series in the

British Museum bears a determination label in Baly's handwriting, and a Wallace locality label. Moreover it fits Baly's description of the species in all respects. It is this specimen, a male, that is redescribed here.

This species is similar to *D. bryanti* and *D. frontalis*, but has a deep humeral sulcus and a pronotum which narrows strongly towards the base (Text-fig. 12B).

Deretrichia nigronotata sp. n.

(Text-figs. 9D, 10D, 12I)

♂ *Length* 4·2 mm. *Colour* black, elytra with a blue sheen, antennae flavous, head and legs black tinged with varying amounts of brown particularly on the tarsi, scutellum amber. *Head* shagreened, epicranium with small, indistinct punctures, longitudinally rugose at the base, an epicranial suture extending back to a point well behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus distinctly punctate, as broad as long, sides diverging slightly from posterior to anterior, anterior edge emarginate, emargination forming one third of the circumference of a circle, antennae reaching halfway down the elytra, 2nd segment short, 1st longer than 2nd, 3rd longer than 1st, 4th–11th approximately equal and each longer than 3rd. *Thorax* (Text-fig. 12I) of male 1·4 × 2·3 mm., of female 1·25 × 2·3 mm., marginate, sides evenly rounded, very lightly shagreened, distinctly punctate except at the extreme anterior edge where the punctures are vestigial ; tibiae ridged, prothoracic tibiae of male with a large blunt spine on the dorsal surface one third of the way from the proximal end, spines on the ventral surface of the femora extremely small. *Scutellum* cordiform with a flat base, as wide as long, very lightly shagreened with small, indistinct punctures. *Elytra* of male × 2·2, of female × 2·3 as long as thorax, as broad as thorax, humeri and basilar space raised, humeral sulcus and transverse depression shallow, punctate-striate, punctures deep within the transverse depression and humeral sulcus, shallow on the basal area, and vestigial at the apices, interstices slightly convex. Genitalia, male, Text-fig. 9D ; female, Text-fig. 10D.

Holotype : male, " NEW GUINEA, Munika Bay ", date unknown " (*F. R. Wollaston*) ", presented to the British Museum (Nat. Hist.) 1911.

Paratype : male, data as above.

This species together with *D. livida* and *D. viridis* forms a group characterized by the coloured sheen of the elytra. *D. nigronotata* is smaller than the other two species and has a pronotum as broad as, or broader than the elytra. Both the other species have a pronotum much narrower than the elytra.

Deretrichia livida sp. n.

(Text-figs. 9E, 10E, 12G)

♂ ♀ *Length* 5·3–5·8 mm. *Colour* black, elytra with a blue-green sheen, scutellum very dark brown or black, antennae with segments 1–3 brown, and 4–11 black with a brown apex, labrum brown. *Head* with epicranium lightly shagreened with a few minute punctures, lightly ridged longitudinally along the base, an epicranial suture extending to well behind a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus very lightly shagreened, with large shallow punctures most numerous anteriorly, broader at the base than long, sides very strongly diverging anteriorly, anterior edge emarginate, emargination forming one sixth of the circumference of a circle, antennae reaching one third of the way down the elytra, 2nd segment shorter than 3rd, 3rd shorter than 1st, 5th–11th approximately equal in length and each longer than 1st, 4th longer than 5th. *Thorax* (Text-fig. 12G) of male 2·4 × 1·5 mm., of female 2·6 × 1·5 mm., pronotum marginate, shagreened with numerous small punctures, sides strongly converging from one third of the way from the base towards the apex ; femora with many blunt spines, a larger spine on the ventral surface, tibiae heavily ridged, with a dorsal spine on the male pro-thoracic tibiae. *Scutellum* lightly shagreened, impunctate, cordiform with a flat base. *Elytra* of male × 2·3, of female × 2·6 as long as pronotum, humeri and basal area raised and bounded behind by a shallow, transverse depression, punctures large and deep in the transverse depression and humeral sulcus reduced on the basal area and humeri and vestigial towards the apices, interstices smooth and glabrous. Genitalia, male, Text-fig. 9E ; female, Text-fig. 10E.

Holotype : female, " DUTCH NEW GUINEA, Cyclops Mts. 3,500 ft. iii. 1936 (*L. E. Cheesman*) ".

Paratypes : one male and one female, "GERMAN NEW GUINEA ", date unknown " (*Bennigsen*) ", Deutsche Entomologisches Institut, Berlin-Dahlem.

This species is similar to *D. nigronotata* but has a pronotum much less broad than the elytra. It is also similar to *D. viridis* but has a much longer epicranial suture, a more granulate pronotum, more heavily ridged tibiae and a blue-green sheen and very dark brown scutellum.

***Deretrichia viridis* sp. n.**

(Text-figs. 10F, 12M)

♀ *Length* 5·8 mm. *Colour* black, elytra with a green sheen, antennae light brown, 6 distal segments tinged with black, scutellum amber. *Head* shagreened, epicranium with many small indistinct punctures, longitudinally ridged at the base, an epicranial suture extending to a point just anterior to the back of the eyes, sutures between epicranium and frontoclypeus discernible but indistinct, frontoclypeus with small yet clearly-defined punctures, sides approximately parallel, anterior edge emarginate, emargination forming one quarter of the circumference of a circle, antennae short, with 6 distal segments broadened and more heavily setate than the proximal 4, and reaching one quarter of the way down the elytra, 2nd segment short, 3rd longer than 2nd and equal to 1st and 5th–11th, 4th longer than 3rd. *Thorax* (Text-fig. 12M) 1·4 × 2·7 mm., pronotum glabrous, minutely shagreened with numerous small, very distinct punctures, sides margined, converging from one third of the way from the base towards the apex, but not in a smooth curve ; legs, tarsi ridged, femora with a small well-formed spine on the ventral surface two fifths of the distance from apex to base. *Scutellum* broader than long, cordiform with a flat base, glabrous, very lightly shagreened, impunctate. *Elytra* × 2·8 as long as thorax, broader than thorax, basal area and humerus raised, humeral sulcus and transverse depression deep and clearly defined, punctures large and deep in the transverse depression, reduced on basal area, humeri, and towards the apices ; interstices smooth and glabrous with a few minute punctures. Genitalia, female, Text-fig. 10F.

Holotype : female, " PAPUA, Mafulu 4,000 ft., i. 1934 (*L. E. Cheesman*) ".

This species is similar to *D. nigronotata* but has a pronotum narrower than the elytra. It is also similar to *D. livida* but has a shorter epicranial suture, a less granulate pronotum, and less heavily ridged tibiae. It has a green sheen and an amber-coloured scutellum. The male is unknown.

***Deretrichia paumomuensis* sp. n.**

(Text-figs. 10G, 12E)

♀ *Length* 4·5 mm. *Colour* black with a red sheen, scutellum amber, elytra with a single red spot one quarter of the way from the base and extending almost to the sides but not to the suture. *Head* very lightly shagreened, epicranium with a few minute punctures, a sharply-defined epicranial suture extending to a point well behind the level of the back of the eyes, sutures between epicranium and frontoclypeus vestigial, frontoclypeus with well-defined, evenly-spaced small punctures, sides approximately parallel, anterior edge emarginate, emargination forming one eighth of the circumference of a circle, antennae short, reaching one third of the way down the elytra, terminal segments broad, 2nd segment short, 1st and 3rd equal in length and longer than 2nd, 4th–11th approximately equal and each longer than 3rd. *Thorax* (Text-fig. 12E) 1·2 × 2·2 mm., sides rounded, margined, surface very lightly granulose with small widely-spaced punctures ; tibiae of female ridged, femora with a minute spine on the ventral surface one quarter of the way from the distal end. *Scutellum* cordiform with a flat base, very lightly shagreened with minute punctation. *Elytra* × 2·4 as long as pronotum, just broader than thorax, humeri a little raised, basal area flat, humeral sulcus very shallow, no transverse depression, punctures large and well-defined, becoming indistinct near the apex, interstices slightly raised, glabrous, with scattered minute secondary punctures. Genitalia, female, Text-fig. 10G.

Holotype : female, " S.E. NEW GUINEA, Paumomu river, ix-xii. 1892 (*Loria*), ex Museo Civico, Genoa," British Museum (Nat. Hist.) No. 1909–28a, purchased from O. E. Janson, selected from the Jacoby collection.

This species is superficially similar to *D. bipustulata*, but it is larger, has a red sheen, and is much wider especially at the thorax. The pronotum has the intervals lightly granulate and the elytra have the intervals glabrous with minute secondary punctures.

Deretrichia bipustulata (Baly). **comb. n.**

(Text-figs. 10H, 12S)

Rhyparida bipustulata Baly, 1867 : 199.

♀ *Length* 4·2 mm. *Colour* black with a blue sheen, a single red spot one third of the way down each elytron, a deep amber scutellum, and a pair of diffuse red spots on the frons, maxillary palpi and bases of antennae flavous. *Head* very lightly shagreened, epicranium impunctate with a short epicranial suture extending to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus distinct, frontoclypeus with rounded sides, anterior border emarginate, emargination forming one fifth of the circumference of a circle, antennae extending to one third of the way down the elytra, 2nd segment short, 1st equal to 3rd but longer than 2nd, 4th–11th approximately equal but each longer than 1st. *Thorax* (Text-fig. 12S) 2·0 × 1·1 mm., pronotum with sides evenly rounded, lightly margined, lightly shagreened, minutely but distinctly punctate ; tibiae ridged, femora with a minute tooth on the ventral surface one quarter of the way from the distal end. *Scutellum* cordiform, impunctate, lightly shagreened. *Elytra* × 2·2 as long as thorax, broader than thorax, without transverse depression, basal area not raised, humeri only slightly raised, punctures continuing to the apex with little reduction in size, interstices smooth and glabrous, faintly convex anteriorly. Genitalia, female, Text-fig. 10H.

Lectotype : female, " WAIGIOU ", vi–vii . 1860 (*A. R. Wallace*), from the Baly collection. By present selection.

This species and *D. paumomuensis* are unique in the genus. The red-spotted elytra, the general lightness of the punctation and the poor definition of the head sutures readily differentiate them from all other species. *D. bipustulata* is shorter than *D. paumomuensis* and is much narrower, especially at the thorax. It has a blue sheen and a pronotum with intervals lightly shagreened, and the elytral intervals are glabrous without secondary punctures.

Deretrichia guadalcanalensis sp. n.

(Text-figs. 8, 10 I, 12 O)

♀ *Length* 3·2 mm. *Colour* unicolorous flavous. *Head* with epicranium glabrous with a few indistinct punctures, a very indistinct epicranial suture extending from a point immediately in front of the back of the eyes to a point just behind the back of the eyes, no sutures between epicranium and frontoclypeus, frontoclypeus glabrous with a circlet of large punctures flanked by a pair on either side near the base of the antennae, sides strongly diverging from base to apex, anterior edge emarginate, emargination forming one eighth of the circumference of a circle, antennae with segments 3–11 missing. *Thorax* (Text-fig. 12O) 0·9 × 1·5 mm., sides rounded, strongly converging from one third of the way from the base towards the apex, strongly margined especially at the widest point of the thorax, very heavily punctate, punctures lying between longitudinally-elongated rugosities, most developed laterally, rugosities and punctures vestigial along the mid-line and extreme anterior border ; legs with toothed femora and ribbed tibiae. *Scutellum* cordiform, wider than long, with a flat base, impunctate, glabrous. *Elytra* × 2·4 as long as thorax, basal area and humeri slightly raised and bounded behind by a shallow transverse depression, punctures lying along longitudinal grooves and most heavily impressed within the transverse depression and vestigial at the apex, interstices convex in the basal area, glabrous. Genitalia, female, Text-fig. 10I.

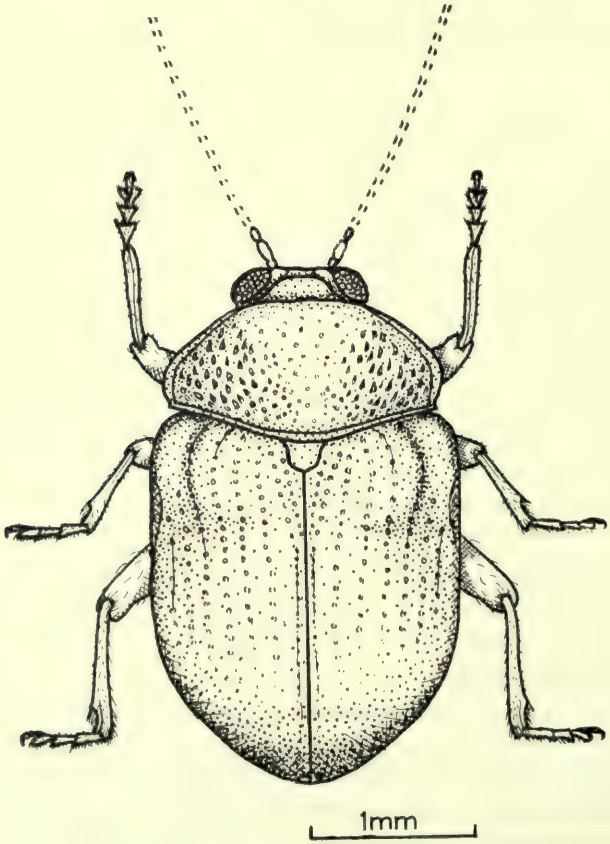

FIG. 8. *Deretrichia guadalcanalensis* sp. n. ♀.

Holotype : female, SOLOMON ISLANDS, " Guadalcanal, iii.1887 (*C. M. Woodford*) ".

This species, together with *D. ruginotum* and *D. sordida* forms a distinct group characterized by an extremely rugose thorax. It is smaller than *D. ruginotum* and *D. sordida*, the pronotum is more rugose, and the elytra more elongate and heavily punctured. *D. guadalcanalensis* is very light brown, the pronotum narrows strongly anteriorly and the frontoclypeus has a very few, very large punctures. The male is unknown.

***Deretrichia ruginotum* sp. n.**

(Text-figs. 9F, 10J, 12J)

♂ ♀ *Length* 3·75–4·5 mm. *Colour* unicolorous dark brown. *Head* shagreened, epicranium with indistinct punctation, a distinct epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus about as long as broad, sides approximately parallel, anterior edge emarginate, emargination forming five sixteenths of the circumference of a circle, deeply punctate, interstices forming longitudinal ridges, antennae reaching just over halfway down the elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 4th–11th approximately equal and each longer than 3rd. *Thorax* (Text-fig. 12J) 1·25 × 2·1 mm., pronotum heavily punctate with longitudinal rugosities, greatest at the sides, least along the mid-line, interstices shagreened, marginate ; tibiae of male ridged with a large blunt tooth one third of the way from the proximal end on the dorsal surface, femora with a small tooth on the ventral surface, tibiae of female without teeth. *Scutellum* cordiform with a flat base, shagreened, impunctate. *Elytra* × 2·0 as long as thorax, just wider than thorax, basal area and humerus slightly raised, humeral sulcus and transverse depression very shallow, punctures large and distinct especially within the humeral sulcus, reduced towards the apex, interstices slightly raised. Genitalia, male, Text-fig. 9F ; female, Text-fig. 10J.

Holotype : male, " GILOLO ", i–iv.1858 (*A. R. Wallace*), No. 28802 from the Fry collection, British Museum (Nat. Hist.), No. 1905. 100.

Paratypes : male, " GILOLO ", and male and female, " BATCHIAN ", ix.1858–iv.1859 (*A. R. Wallace*). The Batchian male is in the Manchester Museum.

This species belongs to the distinct group characterized by an extremely rugose pronotum. It may be distinguished from *D. sordida* by the more posteriorly narrowed and ridged pronotum, and the lighter colour ; from *D. guadalcanalensis* by the less rugose and less anteriorly-narrowed pronotum, the densely punctured frontoclypeus and the darker colour.

Deretrichia sordida* (Baly) comb. n.

(Text-figs. 10K, 12H)

Rhyparida sordida Baly, 1864 : 10.
Rhyparida sordida Baly, 1867 : 182.

♀ *Length* 4·5 mm. *Colour* dark brown, almost black, with scutellum, head, middle of the anterior border of the thorax, and all appendages rufo-piceous. *Head* heavily shagreened, epicranium with faint, scattered punctures, a short shallow suture extending to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus visible but not distinct, frontoclypeus as broad as long, sides diverging very slightly from posterior to anterior, anterior edge emarginate, emargination forming one quarter of the circumference of a circle, surface impressed with many large deep punctures, antennae reaching halfway down the elytra, 2nd segment short, 1st longer than 2nd, 3rd longer than 1st, 4th longer than 3rd, 5th–11th each approximately equal to 3rd. *Thorax* (Text-fig. 12H) 2·2 × 1·1 mm., sides margined and evenly rounded, surface very closely and deeply punctured, each puncture elongated, deepest at the posterior end and partially confluent with the adjacent punctures along an antero-posterior line forming rough ridges, interstices thickened and heavily shagreened ; tibiae lightly ridged, femora without a tooth on the ventral surface. *Scutellum* cordiform with a flat base, impunctate, shagreened. *Elytra* × 2·8 as long as and broader than thorax, basal area and humeri slightly raised, transverse depression and humeral sulcus shallow but distinct, punctures deep and distinct especially within the transverse depression and humeral sulci, becoming vestigial towards the apex, interstices glabrous, slightly but distinctly convex on the basal area. Genitalia, female, Text-fig. 10K.

A female ," BATCHIAN ", 1859 (*A. R. Wallace*), from the Baly collection, is in the British Museum (Nat. Hist.). This specimen is from one of the two type localities. It is almost certainly a syntype. It is this specimen which is redescribed. The other type locality is Ternate. A second female, " TERNATE ", 1858 (*A. R. Wallace*), is in the Manchester Museum.

This species belongs to the group characterized by an extremely rugose pronotum. It may be distinguished from *D. ruginotum* by the more quadrate and less ridged and posteriorly-constricted pronotum, and the darker colour ; from *D. guadalcanalensis* by the less rugose and less anteriorly narrowed pronotum, the more densely punctured frontoclypeus and darker colour.

***Deretrichia doryensis* sp. n.**

(Text-figs. 9G, 12L)

♂ ♀ *Length* 5·0–5·5 mm. *Colour* flavous, head and thorax fuscous. *Head* shagreened, epicranium with many very small, obscure, shallow punctures, a well-defined epicranial suture extending back to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus as long as broad with many large punctures, punctures closest on the posterior and anterior margins, sides almost parallel, anterior edge emarginate, emargination forming one third of the circumference of a circle, antennae reaching one third of the way down the elytra, 2nd segment short, 3rd longer than 2nd and equal to 1st, 5th–11th approximately equal and each longer than 3rd, 4th longer than 5th. *Thorax* (Text-fig. 12L) 1·3 × 2·4 mm., strongly margined, sides rounded, surface glabrous with many large punctures ; legs stout, tibiae ridged with a blunt spine one third of the way from the base, mesothoracic tibiae shorter and more massive than those of the metathorax, femora with a small spine on the ventral surface one quarter of the way from the base. *Scutellum* cordiform with a flat base, lightly shagreened, impunctate. *Elytra* × 2·5 as long as thorax, just broader than thorax, basal area and humerus hardly raised, transverse depression and humeral sulcus shallow and ill-defined, boldly punctured over the entire surface, sutural striae grooved for apical three fourths of elytral length, interstices glabrous and slightly raised on the basal area. Genitalia, male, Text-fig. 9G.

Holotype : male, NEW GUINEA, " Dory ", collector and date unknown.

Paratype : female, data as above.

Both the holotype and paratype were purchased by the British Museum (Nat. Hist.) 1858–1859 from Stevens.

This is the largest member of the group of almost unicolorous, light brown species mostly found on the mainland of New Guinea.

D. doryensis is similar to *D. plebeja* and *D. approximata*, but it is larger, the frontoclypeus has almost parallel sides, the sutures between the frontoclypeus and the epicranium are distinct, and the epicranial suture extends as far as the back of the eyes.

Deretrichia timorensis (Jacoby) **comb. n.**

(Text-figs. 9H, 12T)

Rhyparida timorensis, Jacoby, 1894 : 278.

♂ *Length* 3·5–3·7 mm. *Colour* fulvous. *Head* shagreened, epicranium with vestigial punctures, an epicranial suture extending to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus with numerous large, shallow punctures, sides very slightly diverging anteriorly, anterior edge emarginate, emargination forming three eighths of the circumference of a circle, antennae extending to one third of the way down the elytra, 2nd segment short and equal to 3rd, 1st and 4th–11th approximately equal and each longer than 2nd. *Thorax* (Text-fig. 12T) 1·0–1·1 × 1·6–1·7 mm., pronotum much more rectangular in shape than in most species, marginate, margins indented and buckled, closely and evenly punctured, punctures clearly defined although small, interstices shagreened, an ill-defined chevron-shaped transverse depression behind the anterior border ; anterior tibiae strongly ridged, those of the male with a large blunt tooth on the dorsal surface equidistant from each end, femora with a blunt tooth on the ventral surface one third of the way from the distal end. *Scutellum* cordiform, shagreened, impunctate. *Elytra* × 2·2 as long as thorax, slightly broader than thorax, basal area little raised, humeri well developed, transverse depression and humeral sulci small and shallow, punctation well-developed within the transverse depression and humeral sulci, reduced on the basal area and vestigial towards the apices, interstices flat. Genitalia, male, Text-fig. 9H.

Lectotype : male, " TIMOR ", date unknown " (*W. Doherty*) ", in the Bowditch collection of the Museum of Comparative Zoology, Harvard " (Type No. 9818) ". By present selection.

Paralectotype : male, " TIMOR ", date unknown " (*W. Doherty*) ", in the Bowditch collection of the Museum of Comparative Zoology, Harvard. By present selection.

This very distinct species is similar to *D. pinguis*, but it has longer almost parallel-sided elytra and a much more rectangular pronotum.

Deretrichia sulcicollis (Baly) **comb. n.**

(Text-figs. 9I, 12Q)

Rhyparida sulcicollis Baly, 1867 : 199.

♂ *Length* 3–4 mm. *Colour* dark brown, appendages slightly lighter. *Head* shagreened, epicranium opaque and very minutely punctate, a deep epicranial suture extending to a point well behind the level of the back of the eyes, sutures between epicranium and frontoclypeus indistinct, frontoclypeus with sides diverging from back to front, anterior border emarginate, emargination forming one eighth of the circumference of a circle, antennae extending one quarter of the way down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th longer than 1st, 5th–11th approximately equal and each longer than 1st but shorter than 4th. *Thorax* (Text-fig. 12Q) 1·0 × 1·8 mm., pronotum lightly shagreened, thinly and obscurely punctured, median anterior edge impunctate, sides rounded, lightly margined, converging from one third of the way from the base towards the apex, a deep chevron-shaped,

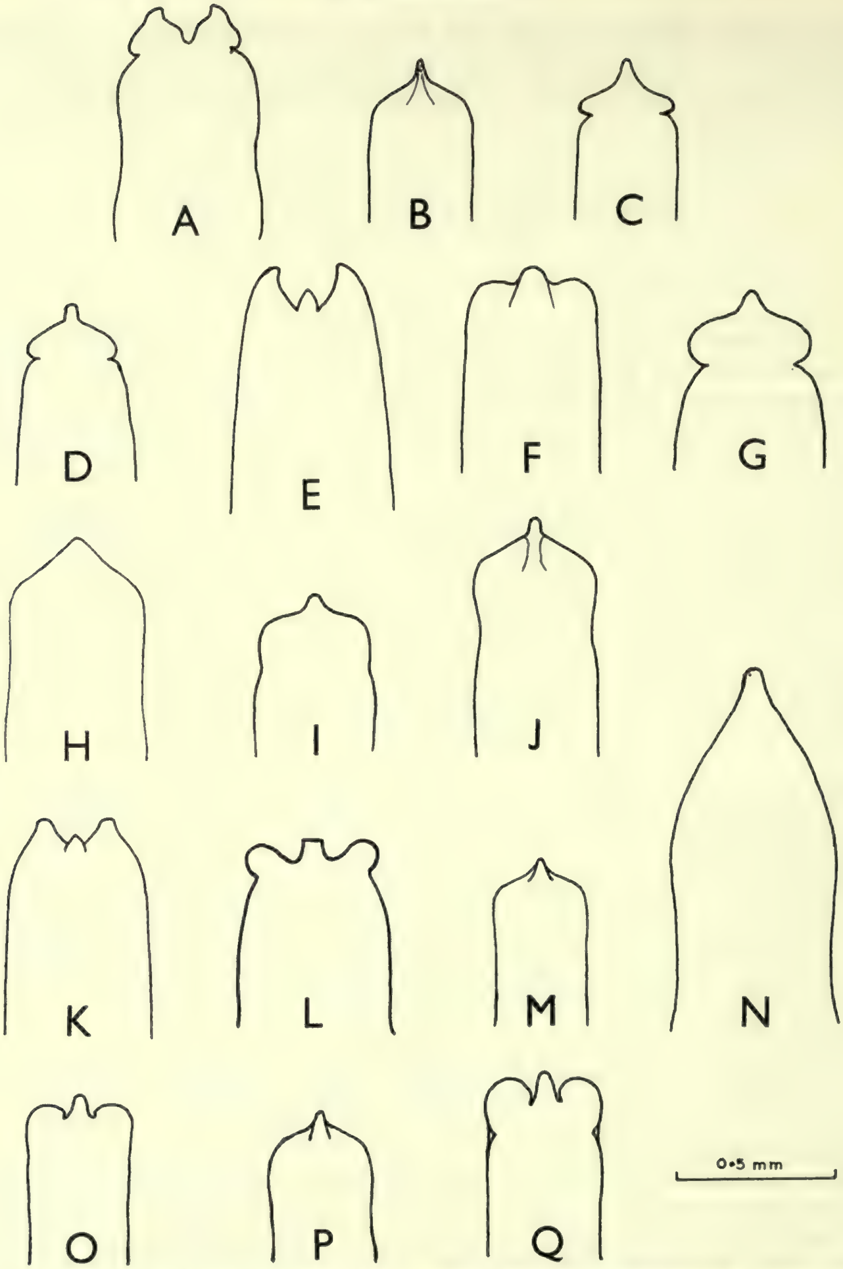

FIG. 9. Tip of aedeagus, dorsal view. A. *Deretrichia amboinensis* sp. n. B. *D. andannensis* (Jacoby). C. *D. tibialis* (Baly). D. *D. nigronotata* sp. n. E. *D. livida* sp. n. F. *D. ruginotum* sp. n. G. *D. doryensis* sp. n. H. *D. timorensis* (Jacoby). I. *D. sulcicollis* (Baly). J. *D. batchianica* sp. n. K. *D. plebeja* (Jacoby). L. *D. hincksi* sp. n. M. *D. rothschildi* (Jacoby). N. *D. alternata* (Baly). O. *D. australis* sp. n. P. *D. laevifrons* (Jacoby). Q. *D. giloloensis* sp. n.

transverse depression just behind the anterior edge with the apex pointing posteriorly ; femora with a small tooth on the ventral surface one third of the way from the apex, apical half of the prothoracic femora covered with many small teeth, tibiae ridged. *Scutellum* cordiform, glabrous, lightly shagreened. *Elytra* × 2·1 as long as thorax, broader than thorax, basal area and humeri strongly raised, transverse groove and humeral sulci very distinct, punctation deep within the transverse groove and humeral sulci, reduced on the basal area and towards the apex, interstices convex on the basal area. Genitalia, male, Text-fig. 91.

Lectotype : male, " SULU ISLANDS ", 1860–1861 (*C. Allen*), from the Baly collection. By present selection.

This species is similar to *D. amboinensis* but is smaller, has a deeper depression on the pronotum, a more raised basal area and much less distinct sutures between the frontoclypeus and the epicranium.

Deretrichia pinguis **sp. n.**

(Text-figs. 10M, 13B)

♀ *Length* 3·7 mm. *Colour* brown with dark areas particularly on the pronotum and along the elytral suture. *Head* shagreened, epicranium minutely and indistinctly punctate, an epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus with shallow indistinct punctures, sides slightly diverging anteriorly, anterior edge emarginate, emargination forming five sixteenths of the circumference of a circle, antennae stout, extending halfway down the elytra, 1st segment equal to 3rd and each of 5th–11th, 2nd shorter, 4th longer than 3rd. *Thorax* (Text-fig. 13B) 1·0 × 1·8 mm., pronotum glabrous, very lightly shagreened with sparse, small, shallow punctures along the extremities, sides rounded with a broad margin ; tibiae of female ridged, femora with a blunt tooth on the ventral surface one quarter of the way from the apex. *Scutellum* cordiform with a flat base, very lightly shagreened, impunctate. *Elytra* × 2·6 as long as thorax, just broader than thorax, humeri and basal area slightly raised and bounded behind by a shallow, transverse depression, punctures shallow but distinct within the transverse depression, becoming indistinct on the basal area and the apical half, interstices glabrous and smooth with a few minute scattered punctures. Genitalia, female, Text-fig. 10M.

Holotype : female, " PAPUA, Mafulu, 4,000 ft., i.1934 (*L. E. Cheesman*) ".
Paratypes : two females, data as above.

This species closely resembles *D. muiri*, but can readily be distinguished by the much reduced punctation of the pronotum, elytra, scutellum and frontoclypeus.

Deretrichia nigra **sp. n.**

(Text-fig. 12N)

♀ *Length* 3·6 mm. *Colour* dark brown, with head, scutellum and appendages lighter. *Head* lightly shagreened, epicranium closely but minutely and indistinctly punctate, a short epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus indistinct, frontoclypeus closely but minutely and indistinctly punctate, sides diverging slightly anteriorly, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching over halfway down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd and approximately equal to each of 5th–11th, 4th longer than 1st. *Thorax* (Text-fig. 12N) 1·6 × 0·9 mm., strongly margined, surface with many small but distinct punctures, interstices glabrous and shagreened ; tibiae of female lightly ridged, femora with a small blunt tooth on the ventral surface one third of the way from the apex. *Scutellum* cordiform, impunctate, lightly shagreened. *Elytra* ×2·7 as long as thorax, broader than thorax, basal area and humeri strongly raised and bounded on the posterior side by a clearly-defined, transverse depression, humeral sulci deep, punctures large and deep in the transverse groove and humeral sulci, reduced on the basal area, the humerus and the apical half of the elytra, interstices smooth, flat and glabrous, with a few minute punctures. Genitalia missing.

Holotype : female, " GILOLO ", i–iii.1858 (*A. R. Wallace*), from the Baly collection.

This species is the smallest of the dark-coloured species and is characterized by the closely punctate and heavily granulate pronotum. The male is unknown.

Deretrichia batchianica **sp. n.**

(Text-figs. 9J, 13B)

♂ *Length* 4·2 mm. *Colour* unicolorous dark flavous. *Head* heavily shagreened, epicranium impunctate, a shallow well-defined epicranial suture extending to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus ill-defined, frontoclypeus with ill-defined, shallow punctures, sides diverging strongly from posterior to anterior, anterior edge emarginate, emargination forming one third of the circumference of a circle, antennae reaching halfway down the elytra in the male, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 5th–11th approximately equal and each longer than 1st, 4th longer than 5th. *Thorax* (Text-fig. 13B) 1·1 × 1·9 mm., rounded, strongly margined, surface very lightly shagreened, densely but lightly punctate ; femora with a small spine on the ventral surface, mesothoracic tibiae very deeply emarginate, metathoracic tibiae less so, the male prothoracic tibiae with a prominent tooth almost halfway down the dorsal surface, strongly ridged, the ridges spirally arranged on the apical half. *Scutellum* cordiform, approximately as long as broad, surface impunctate and lightly shagreened. *Elytra* ×2·5 as long as and broader than pronotum, glabrous, basal area and humeri little raised, humeral sulcus and transverse depression very shallow, punctures shallow and ill-defined, most developed within the depression, lighter on the basal area and vestigial towards the apex. Genitalia, male, Text-fig. 9J.

Holotype : male, " BATCHIAN ", ix.1858–iv.1859 (*A. R. Wallace*), from the Baly collection.

This species is similar to *D. brunnea* but is usually smaller, and the pronotum is more finely punctured and more narrowed anteriorly.

Deretrichia pallidocaudata **sp. n.**

(Text-figs. 10N, 13F)

♀ *Length* 4·5 mm. *Colour* dark brown ; head, tibiae, tarsi, proximal half of the femora and apex of the elytra lighter. *Head* with epicranium shagreened with many large shallow, but very obscure punctures, an epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus shagreened with many large, shallow, obscure punctures, sides strongly diverging, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching halfway down elytra, 1st, 2nd and 3rd segments almost equal, 4th–11th longer than 3rd and subequal. *Thorax* (Text-fig. 13F) 2·1 × 1·2–1·9 × 1·1 mm., pronotum heavily margined, sides smoothly rounded, surface glabrous, very lightly granular, closely punctate, punctures small and shallow but distinct, a very shallow, ill-defined, chevron-shaped depression just behind the anterior border, extending across the surface and least distinct on the middle of the disc ; tibiae of female heavily ridged, meso- and meta-tibiae heavily emarginate, femora with a small blunt spine on the ventral surface one third of the way from the apex. *Scutellum* cordiform with a

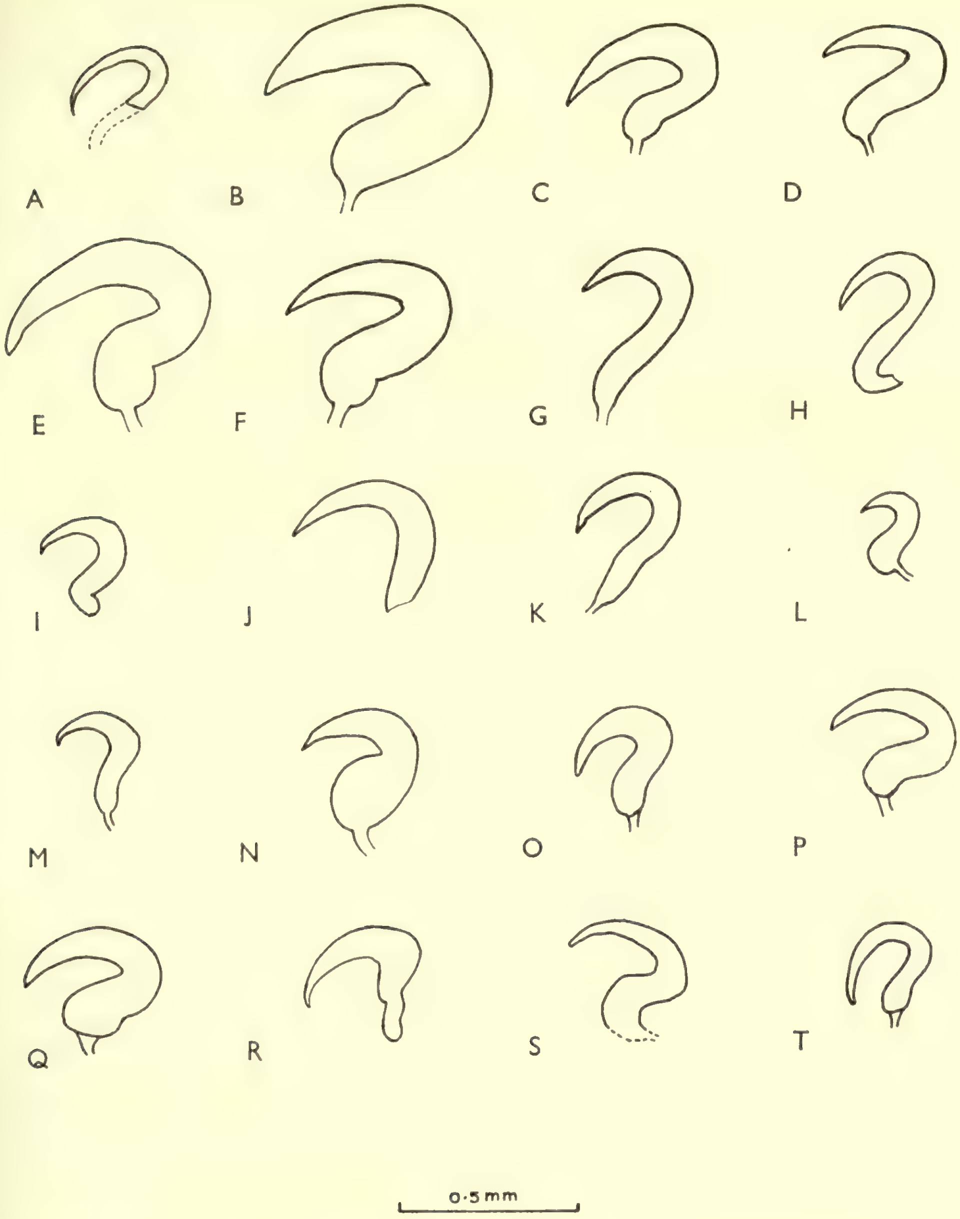

FIG. 10. Spermatheca, lateral view. A. *D. minuta* sp. n. B. *D. morokensis* sp. n. C. *D. andannensis* (Jacoby). D. *D. nigronotata* sp. n. E. *D. livida* sp. n. F. *D. viridis* sp. n. G. *D. paumomuensis* sp. n. H. *D. bipustulata* (Baly). I. *D. guadalcanalensis* sp. n. J. *D. ruginotum* sp. n. K. *D. sordida* (Baly). L. *D. inornata* (Jacoby). M. *D. pinguis* sp. n. N. *D. pallidocaudata* sp. n. O. *D. approximata* (Baly). P. *D. intermedia* (Baly). Q. *D. hincksi* sp. n. R. *D. rothschildi* (Jacoby). S. *D. cyclopensis* sp. n. T. *D. bryanti* sp. n.

flat base, shagreened with a few minute and very indistinct punctures. *Elytra* × 2·6 as long as thorax, broader than thorax, humeri and basal area strongly raised, humeral sulci and transverse depression deep and distinct, punctures large and distinct within the humeral sulcus and transverse depression, indistinct on the basal area, humeri and posterior half of the elytra. Genitalia, female, Text-fig. 10N.

Holotype : female, " CERAM ", 1860 (*A. R. Wallace*), from the Baly collection. Paratype : female, data as above. In the Manchester Museum.

This species is similar to *D. pallida*, but is larger and lighter with the scutellum and elytra of the same colour, and it has a less granular pronotum with a chevron-shaped depression. The holotype bears a Baly label with the annotation " Var. A. Type, near *Rhyparida brunnea* ". However no description of this " Variety ", was published. The male is unknown.

Deretrichia approximata (Baly)

(Text-figs. 10 O, 13C)

Rhyparida approximata Baly, 1867 : 184.
Deretrichia approximata (Baly) Weise, 1912 : 425.

♀ *Length* 4·2 mm. *Colour* very dark brown, almost black, epicranium and legs chestnut brown, head appendages flavous. *Head* with epicranium heavily shagreened with many small, distinct punctures, a deep epicranial suture extending to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus indistinct, frontoclypeus granulate with distinct shallow punctures, sides diverging slightly anteriorly, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching one third of the way down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th–11th approximately equal and each longer than 1st. *Thorax* (Text-fig. 13C) 2·5 × 1·25 mm., sides margined and converging from one third of the way from the base, surface glabrous and very lightly shagreened with numerous punctures, punctures large and deeply impressed at the sides, shallow along the mid-line ; anterior tibiae of female strongly ribbed, femora with a small blunt tooth on the ventral surface one quarter of the way from the apex. *Scutellum* broader than long, cordiform with a flat base, shoulders obsolete, shagreened, impunctate. *Elytra* × 2·7 as long as thorax, slightly broader than thorax, a broad but shallow transverse depression behind the basilar space, humeri sub-prominent, punctures large and distinct, especially within the transverse depression and humeral sulci, shallow and indistinct towards the apex, interstices smooth and glabrous, just perceptibly convex. Genitalia, female, Text-fig. 10O.

Lectotype : female, " MYSOL ", 1860 (*A. R. Wallace*), from the Baly collection. By present selection.

This species and *D. plebeja* are closely related but *D. approximata* has a chestnut brown epicranium and large punctures on the elytra. The male is unknown.

Deretrichia plebeja (Jacoby)

(Text-figs. 9K, 11H, 13A)

Rhyparida plebeja Jacoby, 1894 : 281.
Deretrichia plebeja (Jacoby) Weise, 1912 : 425.
Rhyparida nigrita Bryant, 1949 : 921 (**Syn. n.**).

♂ ♀ *Length* 4·0–5·0 mm., male generally shorter than female. *Colour* very dark brown, almost black, head appendages, claws and clypeus fulvous, segments 1–5 of antennae fulvous, 6–11 dark brown. *Head* lightly shagreened, epicranium with posterior part lightly punctured, a short deep epicranial suture extending to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus deeply punctate, just longer than broad, sides strongly diverging from posterior to anterior, anterior edge emarginate, emargination forming three eighths of the circumference of a circle, antennae reaching halfway down the elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 5th–11th approximately equal and each longer than 1st, 4th longer than 5th. *Thorax* (Text-fig. 13A), female 2·75 × 1·6 mm., male 2·2 × 1·25 mm., pronotum with sides rounded, converging from one third of the way from the base towards the apex, margined, punctures small and well spaced, interstices glabrous and very slightly shagreened ; tibiae ridged, those of male with a tooth on the mid-dorsal surface, femora with a minute tooth on the mid-ventral surface. *Scutellum* cordiform, impunctate, glabrous. *Elytra* male, × 2·25 and female × 2·3 as long as thorax, just wider than thorax, basal area and humeri strongly raised, transverse depression and humeral sulci deep, punctures large and deep within the transverse depression and humeral sulci, reduced on the basal and mid-elytral areas, vestigial at the apices, interstices flat and glabrous. Genitalia, male, Text-fig. 9K ; female Text-fig. 11H.

Lectotype : male, " NEW GUINEA, Humbolt Bay ", probable date of collection 1892 " (*W. Doherty*) ", from the Jacoby collection. By present selection.

Other material : the male holotype of *Rhyparida nigrita* Bryant, a synonym of *D. plebeja*, and eleven male and seven female paratypes, " NEW GUINEA, Cyclops Mts., 3,500 ft., iii.1936 (*L. E. Cheesman*) ", in the British Museum (Nat. Hist.).

This species is very close to *D. approximata* Baly, but may be distinguished from it by the lack of a red epicranium, and the much reduced punctation of the elytra.

Deretrichia brunnea (Baly) **comb. n.**

(Text-fig. 13G)

Rhyparida brunnea Baly, 1867 : 196.

♂ *Length* 4·8 mm. *Colour* unicolorous dark brown, femora with diffuse black bands before the apices. *Head* shagreened, epicranium closely but very distinctly punctate, epicranial suture extending to a point behind the level of the eyes, sutures between epicranium and frontoclypeus distinct but not deep, frontoclypeus about as long as broad, punctures small and shallow but distinct, sides diverging anteriorly, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching one third of the way down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th longer than 1st, 5th–11th approximately equal and each longer than 4th. *Thorax* (Text-fig. 13G) 2·2 × 1·4 mm., pronotum strongly convex longitudinally and transversely margined, very distinctly punctured with small, round, closely-packed punctures, interstices shiny and very slightly shagreened, especially along the anterior margin, just behind the anterior border a deep, but ill-defined chevron-shaped depression extending across the disc but least distinct in the middle ; femora with a very small tooth on the ventral surface one third of the way from the apices, anterior tibiae of male enlarged and heavily ridged with a conspicuous tooth on the dorsal surface, other tibiae ridged. *Scutellum* cordiform with a flat base and extended shoulders, longer than broad, lightly shagreened, impunctate. *Elytra* × 2·33 as long as thorax, just wider than thorax, basal area and humeri strongly raised and bounded behind by a shallow but distinct transverse depression, strongly sulcate within the humeral calli, strongly punctured within the transverse depression and humeral sulci, punctures less strongly impressed on the basal area and almost obsolete near the apices, interstices flat. Genitalia damaged.

Lectotype : male, " BATCHIAN ", ix.1858–iv.1859 (*A. R. Wallace*), from the Baly collection. By present selection. The tip of the aedeagus has been broken off in the lectotype.

This species shows some similarities to *D. plebeja* but is brown and has a much more finely punctured pronotum which is less narrowed anteriorly. The female is unknown.

Deretrichia intermedia (Baly)*

(Text-figs. 10P, 13E)

Rhyparida intermedia Baly, 1867 : 188.
Deretrichia intermedia (Baly) Weise, 1912 : 425.

♀ *Length* 5·5 mm. *Colour* chestnut brown, basal five segments of antennae, other head appendages and the mid-portion of the femora lighter. *Head* lightly shagreened, epicranium with shallow, very indistinct punctures, an epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus distinct, frontoclypeus approximately as wide as long and boldly punctured, sides approximately parallel, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching halfway down the elytra, 2nd segment short, 1st longer than 2nd and equal to 3rd, 4th and 5th equal but longer than 3rd, 6th–11th approximately equal and each intermediate in length between 3rd and 4th. *Thorax* (Text-fig. 13E) almost ×2 as broad as long, sides strongly margined and converging from one third of the way from the base towards the apex, mid-anterior edge slightly raised and projecting forward to form a small hood over the head, surface smooth and glabrous with numerous small, shallow, distinct punctures, slightly but distinctly elongated longitudinally ; tibiae strongly ridged, prothoracic femora with a large blunt tooth on the ventral surface one third of the way from the apices, tooth much reduced on the meso- and meta-thoracic legs. *Scutellum* cordiform with a flat base, very lightly granulate, impunctate. *Elytra* ×2·43 as long as thorax, just wider than thorax, basal area and humeri slightly raised and bounded behind by a very shallow but distinct transverse depression, punctures large and very distinct, less so on the basal area, the humeri and towards the apices. Genitalia, female, Text-fig. 10P.

A specimen has been determined from the original description. It was collected from the type locality, " WAIGIOU ", vi–viii.1860 (*A. R. Wallace*), and is almost certainly a syntype. It is this specimen that has been redescribed here and is now in the British Museum (Nat. Hist.).

This species is similar to *D. hincksi* but the pronotum is strongly narrowed towards the base (Text-fig. 13E). The male is unknown.

Deretrichia rothschildi (Jacoby) **comb. n.**

(Text-figs. 9M, 10R, 13T)

Rhyparida rothschildi, Jacoby, 1894 : 277.

♂ ♀ *Length* 2·4–2·6 mm. *Colour* unicolorous fulvous. *Head* shagreened, impunctate, a very short epicranial suture (one twelfth mm.) extending from just in front of the back of the eyes to a point just behind the back of the eyes, sutures between epicranium and frontoclypeus absent, frontoclypeus with sides diverging anteriorly, anterior edge emarginate, emargination forming five sixteenths of the circumference of a circle, antennae extending halfway down the elytra, 2nd segment short, 1st longer than 2nd and approximately equal to 3rd, 4th longer than

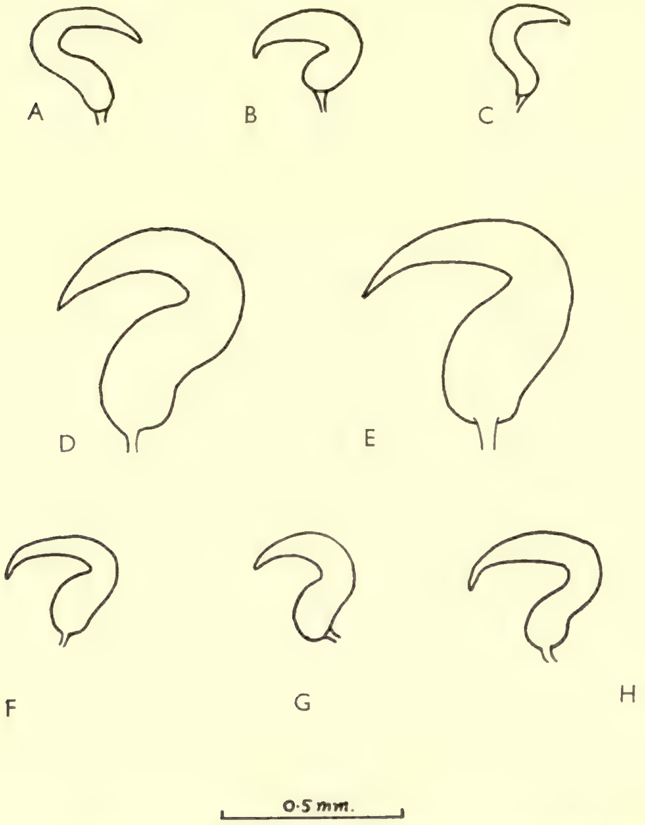

FIG. 11. Spermatheca, lateral view. A. *Deretrichia frontalis* (Baly). B. *D. wallacei* sp. n. C. *D. separata* (Baly). D. *D. alternata* (Baly). E. *D. flebilis* sp. n. F. *D. tibialis* (Baly). G. *D. semipunctata* (Baly). H. *D. plebeja* (Jacoby).

5th. *Thorax* (Text-fig. 13T) 1·4 × 0·9 mm., sides very strongly curved, surface strongly shagreened with numerous shallow, very elongated punctures, an ill-defined, chevron-shaped, transverse depression behind the anterior border ; anterior tibiae strongly ridged, no blunt tooth on the dorsal surface of the male tibia, femora with a very small blunt tooth one third of the way from the apex on the ventral surface in both sexes (the original description by Jacoby stated that the femora were unarmed). *Scutellum* cordiform with a flat base, broader than long, shagreened, impunctate. *Elytra* × 2·43 as long as the thorax, slightly broader than thorax, transverse depression and humeral sulci well-defined, basal area and humeri prominently raised, punctures distinct, especially within the transverse depression and humeral sulci, shallower and less distinct towards the apices, interstices obsoletely convex. Genitalia, male, Text-fig. 9M ; female, Text-fig. 10R.

Lectotype : male, " HALMAHEIRA (Gilolo), 1892 (*W. Doherty*) ", from the Bowditch collection in the Museum of Comparative Zoology, Harvard " (Type No. 9816) ", the left hand specimen of two males mounted on the same card. By present selection.

Paralectotype : male, data as above. Mounted on the same card as the lectotype. By present selection.

Paralectotype : female, data as above, but mounted on a separate card. By present selection.

This species is similar to *D. cyclopensis* but it is shorter and has sparse and very elongated pronotal punctures.

Deretrichia australis sp. n.

(Text-figs. 9 O, 13Q)

♂ *Length* 3·8 mm. *Colour* unicolorous light brown. *Head* shagreened, epicranium with longitudinal rugosities at the base, impunctate, a shallow epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus distinct, frontoclypeus with a few small punctures on the anterior portion, sides diverging from posterior to anterior, anterior edge emarginate, emargination forming one third of the circumference of a circle, antennae missing. *Thorax* (Text-fig. 13Q) 1·1 × 1·9 mm, highly convex, margin narrow, sides very strongly curved, surface glabrous, very lightly shagreened, punctures evenly but thinly distributed, very small and shallow yet distinct, slightly elongated longitudinally; femora with a small blunt tooth on the ventral surface one third of the way from the apex, tibiae ridged with a suggestion of a tooth on the dorsal surface in the male only. *Scutellum* cordiform with a flat base, shagreened with a few indistinct, small punctures on the anterior half. *Elytra* ×2·1 as long as thorax, broader than thorax, basal area and humeri slightly raised, bounded behind by a shallow, transverse depression, punctures small, but distinct, most obvious in the depression and humeral sulci, less so on the basal area and towards the apex, interstices glabrous and smooth. Genitalia, male, Text-fig 9O.

Holotype : male, " QUEENSLAND, Cairns, 21.1.1908 ", collector unknown.

This species and *D. minuta* sp. n. are the first species of *Deretrichia* described from Australia. *D. australis* may be distinguished from the *D. minuta* by the lighter colour, more convex pronotum and the slightly elongated pronotal punctures.

Deretrichia cyclopensis sp. n.

(Text-figs. 10S, 13N)

♀ *Length* 3·1 mm. *Colour* dark brown with very dark brown patches, appendages light brown. *Head* shagreened, epicranium with minute, shallow, indistinct punctures, a deep epicranial suture extending back to a point just behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus with small, shallow but distinct punctures, sides diverging anteriorly, anterior edge emarginate, emargination forming one sixth of the circumference of a circle, antennae reaching almost halfway down the elytra, the 6 distal segments stout, 1st and 3rd–11th segments approximately equal in length, 2nd shorter. *Thorax* (Text-fig. 13N) 1·9 × 1·0 mm., glabrous, very lightly shagreened with many shallow but distinct punctures, slightly elongated in a longitudinal direction, margin narrow; femora with a small blunt tooth on the ventral surface one third of the way from the apex. *Scutellum* cordiform with a flat base, shagreened, impunctate. *Elytra* ×2·1 as long as thorax, broader than thorax, basal area and humeri raised, bounded behind by a transverse depression, punctures large and distinct within the humeral sulci and transverse depression, much reduced on the basal area, vestigial towards the apices, interstices smooth and glabrous. Genitalia, female, Text-fig. 10S.

Holotype : female, " Dutch New Guinea, Cyclops Mts., Mt. Lina 3,500 ft., iii.1936 (*L. E. Cheesman*) ".

This species is similar to *D. pinguis* but may be distinguished by the frontoclypeus with its strongly diverging sides. It is also broader with a larger, slightly more raised basal area and a more sparsely and lightly punctured thorax.

***Deretrichia bryanti* sp. n.**

(Text-figs. 10T, 13I)

♀ *Length* 4·25 mm. *Colour* dark brown, head appendages, scutellum and median and anterior margins of the elytra lighter. *Head* shagreened, epicranium closely but obscurely punctured, an epicranial suture extending to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus indistinct, frontoclypeus scarcely longer than broad, sides approximately parallel, anterior border emarginate, emargination forming one fifth of the circumference of a circle, surface distinctly and evenly punctured, antennae extending to one third of the way down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th longer than 1st, 5th equal to 6th and longer than 1st but shorter than 4th, 7th–11th missing. *Thorax* (Text-fig. 13I) 2·0 × 3·1 mm., pronotum with sides evenly rounded, border narrow, surface closely and deeply punctured, punctures very slightly elongate, interstices lightly shagreened particularly along the anterior margin ; femora with a minute tooth on the ventral surface one third of the way from the apices, tibiae ridged in female. *Scutellum* as broad as long, semi-ovate, very lightly shagreened, impunctate. *Elytra* × 2·7 as long as thorax, slightly broader than thorax, basal area and humeri slightly raised, transverse depression and humeral sulci distinct, deeply punctured, punctures less strongly impressed although distinct towards the apex, interstices flat and smooth. Genitalia, female, Text-fig. 10T.

Holotype : female, " Gilolo ", i–iv.1858 (*A. R. Wallace*), from the Jacoby collection.

This species is near *D. frontalis*, but it is smaller and lighter and the pronotum is smoother in outline and more heavily punctured. The male is unknown.

***Deretrichia frontalis* (Baly)**

(Text-figs. 11A, 13J)

Rhyparida frontalis Baly, 1867 : 181.
Deretrichia frontalis (Baly) Weise, 425.

♀ *Length* 4·5 mm. *Colour* very dark brown, appearing black ; head, scutellum, appendages and abdomen light brown. *Head* epicranium shagreened with shallow, indistinct punctures, an epicranial suture extending back to a point just posterior to the level of the back of the eyes, suture between epicranium and frontoclypeus indistinct, frontoclypeus with shallow punctures, denser on the posterior half than on the anterior half, interstices very lightly granulate, as long as broad, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae extending one third of the way down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th longer than 1st, 5th–11th each equal to 1st. *Thorax* (Text-fig. 13J) 2·3 × 1·25 mm., sides rounded, converging from one third of the way from the base towards the apex, strongly margined, surface distinctly and very closely punctured at the sides and on the disc, punctures slightly elongated, interstices glabrous and very lightly shagreened ; femora with a minute tooth on the ventral surface one third of the way from the apex, anterior tibia of female very ribbed. *Scutellum* broader than long, cordiform with a flat base, shagreened, impunctate. *Elytra* × 2·5 as long as thorax, just broader than thorax,

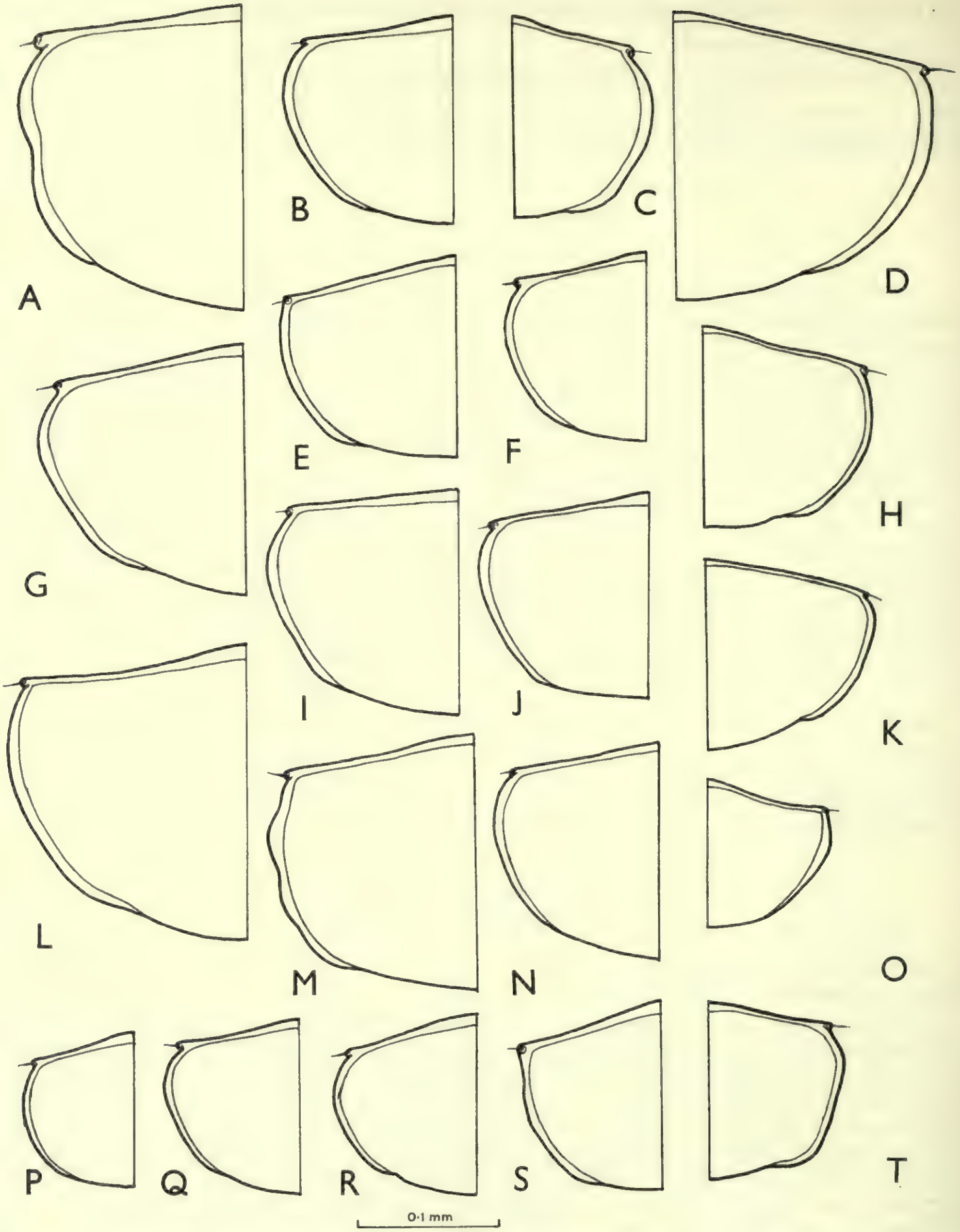

FIG. 12. Pronotum, dorsal view. A. *Deretrichia morokensis* sp. n. B. *D. tibialis* (Baly). C. *D. amboinensis* sp. n. D. *D. laticollis* (Baly). E. *D. paumomuensis* sp. n. F. *D. andannensis* (Jacoby). G. *D. livida* sp. n. H. *D. sordida* (Baly). I. *D. nigronotata* sp. n. J. *D. ruginotum* sp. n. K. *D. papuensis* sp. n. L. *D. doryensis* sp. n. M. *D. viridis* sp. n. N. *D. nigra* sp. n. O. *D. guadalcanalensis* sp. n. P. *D. minuta* sp. n. Q. *D. sulcicollis* (Baly). R. *D. inornata* (Jacoby). S. *D. bipustulata* (Baly). T. *D. timorensis* (Jacoby).

excavated below the basilar space, striae strongly and deeply punctured within the transverse depression and humeral sulci, slightly reduced on the basal area and vestigial at the apices, interstices obsoletely convex on the anterior half, flat posteriorly. Genitalia, female, Text-fig. 11A.

Lectotype : female, " DOREY ", New Guinea, iv–vi.1858 (*A. R. Wallace*), from the Baly collection. By present selection.

This species is similar to *D. bryanti*, but is lighter and has a narrower scutellum. The male is unknown.

Deretrichia hincksi sp. n.

(Text-figs. 9L, 10Q, 13D)

♂ ♀ *Length* 5·5–6·4 mm. *Colour* reddish brown, with appendages and apex of elytra lighter ; many specimens much darker, some almost black, with a reddish-brown area on the anterior half of the epicranium, light brown appendages and no pale apices to the elytra. *Head* lightly shagreened, epicranium with numerous shallow, indistinct punctures, an epicranial suture extending back to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus approximately as wide as long, closely and boldly punctured, sides slightly diverging from base to apex, anterior edge emarginate, emargination forming one third of the circumference of a circle, antennae extending halfway down elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 4th and 5th equal and each longer than 3rd, 6th–11th approximately equal and each intermediate in length between 3rd and 4th. *Thorax* (Text-fig. 13D) pronotum 1·8 × 3·25 mm., sides strongly margined and smoothly rounded, mid-anterior edge slightly raised and projecting forward to form a small hood over the head, surface glabrous, minutely shagreened, with numerous small, evenly-distributed, distinct punctures ; tibiae strongly ridged, male with a large blunt tooth on the dorsal side just proximal to the mid-point of the pro-thoracic tibiae, femora with a minute tooth on the ventral surface near the mid-point. *Scutellum* cordiform with a flat base, much broader than long, glabrous with a few minute punctures. *Elytra* × 2·75 as long as thorax, just wider than thorax, basal area and humeri slightly raised and bounded below by a very shallow, indistinct transverse groove, punctures large and very distinct, less so on the basal area and humeri and towards the apices. Genitalia, male, Text-fig. 9L ; female Text-fig. 10Q.

Holotype : male, " N.W. NEW GUINEA, Manokwari, Amban Zool. Res., 24.iii.1961 (*J. Schreurs*), on cacao leaves ".

Paratypes : three males and four females, data as above. Of the paratypes one male and one female are in the Dept. of Agriculture, Dutch New Guinea.

This species is very variable in colour and size. It most resembles *D. plebeja*, but is lighter and larger and the epipleura are much broader at the base and more evenly tapered. The sides of the pronotum are more evenly curved, the elytral humerus is smaller and the punctation of the pronotum and frontoclypeus is bolder.

Deretrichia wallacei sp. n.

(Text-figs. 11B, 13H)

♀ *Length* 4·5 mm. *Colour* dark brown ; head, appendages, scutellum, posterior part of abdomen, extreme posterior and extreme anterior parts of elytra lighter. *Head* granular, epicranium indistinctly shagreened, an epicranial suture extending back to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus distinct, frontoclypeus scarcely broader than long, very indistinctly punctured, sides approximately parallel, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching one third of the way down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th and 5th equal and longer than 1st, 6th–11th approximately equal and each longer than 4th. *Thorax* (Text-fig. 13H) 2·2 × 1·15 mm., pronotum shagreened, almost twice as broad as long, sides slightly angular, border narrow, surface very closely and deeply punctate, punctures very slightly elongate ; femora with a minute tooth one third of the way from the distal end, tibiae ridged. *Scutellum* cordiform with a flat base, shagreened, impunctate. *Elytra* × 2.95 as long as thorax, just wider than thorax, basal area and humeri distinctly raised, transverse depression and humeral sulci distinct, punctures deep and distinct over the anterior half of the elytra, especially within the transverse groove and humeral sulci, reduced on the posterior half and vestigial towards the apices, interstices raised. Genitalia, female, Text-fig. 11B.

Holotype : female, " MYSOL ", 1860 (*A. R. Wallace*).

This species is similar to *D. bryanti*, but darker. The pronotum is more heavily punctured and the basal area and humeri of the elytra are more raised. The sutures between the epicranium and the frontoclypeus are more distinct. The punctures on the frontoclypeus are larger but sparser. The spermatheca is stouter with a hooked proximal end and bulbous base (Text-fig. 11B).

Deretrichia laevifrons (Jacoby) **comb. n.***

(Text-figs. 9P, 13K)

Rhyparida laevifrons Jacoby, 1884 : 201.

♂ *Length* 4·0 mm. *Colour* fulvous, thorax darker. *Head* heavily shagreened, epicranium impunctate, an epicranial suture extending to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus indistinct, frontoclypeus with a few minute and very indistinct punctures, sides slightly diverging anteriorly, anterior edge emarginate, emargination forming one quarter of the circumference of a circle, antennae extending halfway down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th–11th approximately equal and each longer than 1st. *Thorax* (Text-fig. 13K) 1·1 × 2·0 mm., sides smoothly rounded with a broad margin, punctures small and numerous, very distinct and slightly elongate, interstices shagreened, a shallow, ill-defined, chevron-shaped, transverse depression just behind the anterior border, with the apex pointing posteriorly ; femora with a minute tooth on the ventral surface one third of the way from the apex, tibiae ridged in male, with a small tooth on the ventral surface. *Scutellum* cordiform with a flat base, surface shagreened, impunctate. *Elytra* × 2·3 as long as thorax, just wider than thorax, basal area and humeri strongly raised, transverse groove prominent, punctures deep, especially within the transverse groove and humeral sulci, reduced on the basal area and on the apical half, becoming vestigial at the apices. Genitalia, male, Text-fig. 9P.

Syntypes : NEW GUINEA, 1872 (*L. M. Albertis*), probably in the Genoa Museum. A syntype : male, " NEW GUINEA, Sorong, 1872 (*L. M. Albertis*) ", in the Paris Museum.

This species is similar to *D. giloloensis* but the elytra are more lightly punctured and the basal area is more raised. The pronotum has no depression and is much less heavily punctured. The frontoclypeus is also much less heavily punctured. The female is unknown.

***Deretrichia giloloensis* sp. n.**

(Text-figs. 9Q, 13R)

♂ *Length* 4·2–4·6 mm. *Colour* unicolorous fulvous. *Head* shagreened with many shallow yet distinct punctures, an epicranial suture extending to a point behind the level of the back of the eyes, sutures between epicranium and frontoclypeus very distinct, frontoclypeus heavily punctate, sides diverging slightly from posterior to anterior, anterior edge emarginate, emargination forming one third of the circumference of a circle, antennae reaching halfway down the elytra, 2nd segment short, 3rd longer than 2nd, 1st longer than 3rd, 4th–11th approximately equal and each longer than 1st. *Thorax* (Text-fig. 13R) 1·4 × 2·2 mm., sides evenly rounded and thinly margined, heavily punctate, punctures slightly elongated, interstices shagreened, femora with a small blunt tooth on the ventral surface halfway between base and apex, tibiae ridged, with a large blunt tooth on the dorsal surface one third of the way from base to apex. *Scutellum* cordiform, with a flat base, lightly shagreened, impunctate. *Elytra* × 2·1 as long as thorax, basal area and humeri little raised, transverse depression and humeral sulci shallow, punctation deep and only slightly reduced on the basal areas and apical halves, except at the apex where it is vestigial, interstices very slightly convex. Genitalia, male, Text-fig. 9Q.

Holotype : male, " GILOLO ", i–iv.1858 (*A. R. Wallace*).
Paratype : male, data as above.

This species closely resembles *D. laevifrons* (from the mainland of New Guinea) but the basal area of the elytra is much more heavily punctured and there is no chevron-shaped depression just behind the anterior edge of the pronotum.

***Deretrichia alternata* (Baly) comb. n.**

(Text-figs. 9N, 11D, 13L)

Rhyparida alternata Baly, 1864 : 9.
Rhyparida alternata Baly, 1867 : 166.

♂ ♀ *Length* 6·25–7·25 mm. *Colour* chestnut brown, elytra and mandibles very dark brown, almost black, antennal segments 4–7 dark brown, segments 8–11, labial and maxillary palps flavous. *Head* shagreened, epicranium with a few minute and obscure punctures, a shallow, well-defined epicranial suture extending to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus distinct, frontoclypeus approximately as broad as long, sides diverging slightly anteriorly, anterior edge emarginate, emargination forming one sixth of the circumference of a circle, surface shagreened with numerous well-defined, shallow, evenly-spaced punctures, antennae extending two thirds of the way down the elytra of the male, and halfway down the elytra of the female, 2nd segment short, 1st equal to 3rd but longer than 2nd, 4th–11th approximately equal and each longer than 1st. *Thorax* (Text-fig. 13L) female, 3·1 × 2·0 mm., male, 2·75 × 1·9 mm., pronotum strongly margined, sides rounded, converging from one third of the way from the base to the apex, surface lightly shagreened, finely and deeply punctate, punctures along the anterior margin almost obsolete, a shallow ill-defined, chevron-shaped, transverse depression extending across the disc just posterior to the anterior edge ; legs, femora with a small spine on the ventral surface, mid- and posterior tibiae very deeply emarginate, no difference in legs between sexes. *Scutellum* as broad as long, cordiform with a flat base and extended shoulders, lightly granulate, impunctate. *Elytra* female, × 2·6, male, × 2·3, as broad as thorax, basal area and humeri strongly raised and bounded behind by a transverse depression, humeral sulci deep, punctures large and deep within the transverse depression, lighter on the basilar area, and very indistinct towards the apices. Genitalia male Text-fig. 9N ; female, Text-fig. 11D.

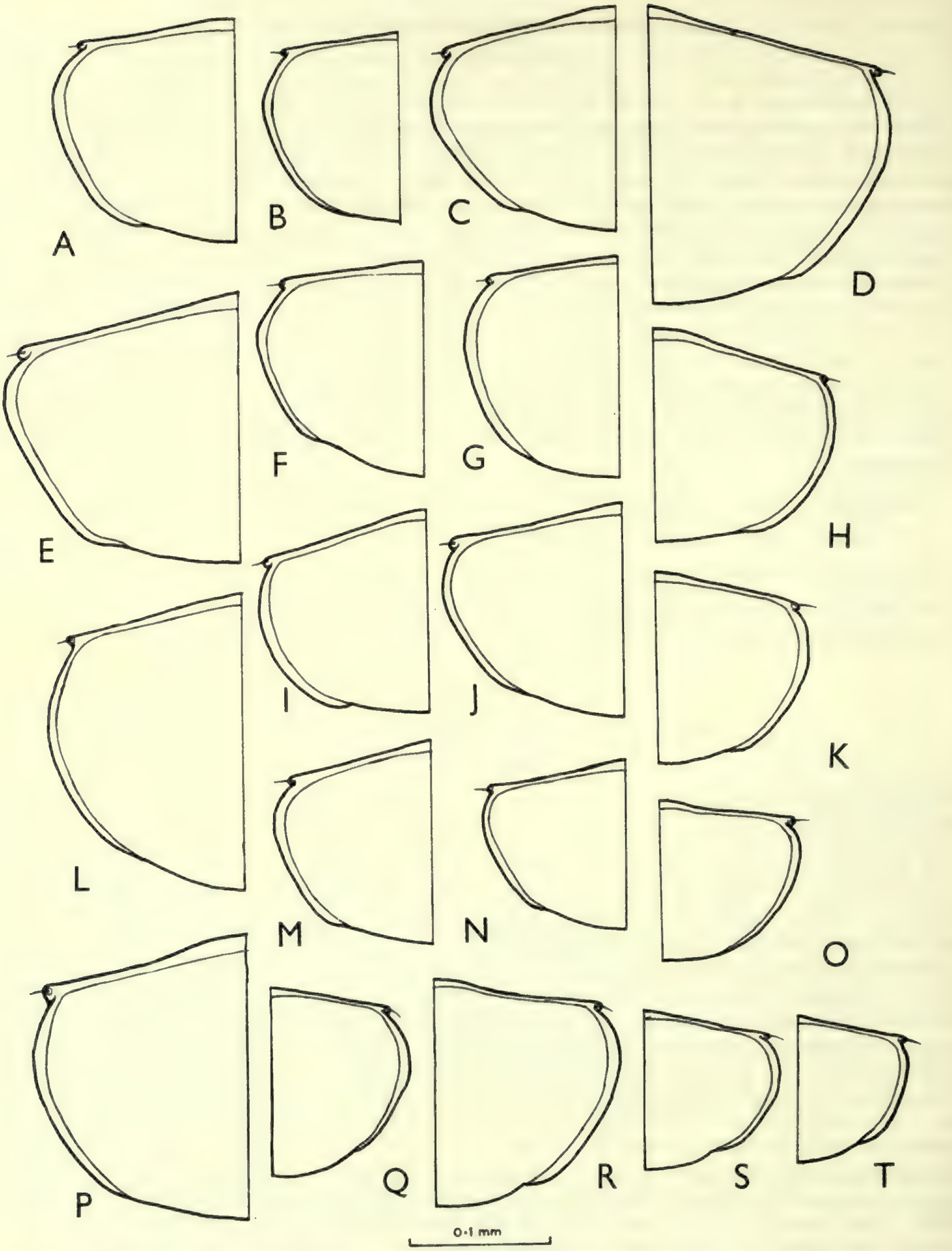

FIG. 13. Pronotum, dorsal view. A. *Deretrichia plebeja* (Jacoby). B. *D. batchianica* sp. n. C. *D. approximata* (Baly). D. *D. hincksi* sp. n. E. *D. intermedia* (Baly). F. *D. pallidocaudata* sp. n. G. *D. brunnea* (Baly). H. *D. wallacei* sp. n. I. *D. bryanti* sp. n. J. *D. frontalis* (Baly). K. *D. laevifrons* (Jacoby). L. *D. alternata* (Baly). M. *D. semipunctata* (Baly). N. *D. cyclopensis* sp. n. O. *D. separata* (Baly). P. *D. flebilis* sp. n. Q. *D. australis* sp. n. R. *D. giloloensis* sp. n. S. *D. pinguis* sp. n. T. *D. rothschildi* (Jacoby).

Lectotype : male, " GILOLO ", i–iv.1858 (*A. R. Wallace*), from the Baly collection. By present selection.

Paralectotype : female, " GILOLO ", i–iv.1858 (*A. R. Wallace*), from the Baly collection. By present selection.

Other material : male, " GILOLO ", date and collector unknown, from the Pascoe collection ; female, " GILOLO ", i–iv.1858, or " BATCHIAN ", ix.1858–iv.1859 (specimen bears a label with both localities), (*A. R. Wallace*), both specimens in the British Museum (Nat. Hist.). Also female, " HALMAHEIRA ", (Gilolo), date and collector unknown, in the Manchester Museum.

This species is very similar to *D. flebilis*, but is more heavily punctured. The frontoclypeus has only slightly diverging sides, the eye is markedly emarginate and the head, pronotum and appendages are chestnut brown.

Deretrichia flebilis **sp. n.**

(Text-figs. 11E, 13P)

♀ *Length* 6·0–6·5 mm. *Colour* flavous, elytra and mandibles dark brown, antennal segments 4–9 brown, 10–11 missing. *Head* shagreened, epicranium with a few very minute and obscure punctures, a shallow, well defined epicranial suture extending to a point well behind the level of the back of the eyes, frontoclypeus approximately as long as broad, sides strongly diverging from back to front, the suture between the epicranium and frontoclypeus distinct but not prominent, anterior border emarginate, emargination forming one sixth of the circumference of a circle, surface very lightly granulate with shallow, obscure punctures, antennae slender, extending two thirds of the way down the elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 4th–11th approximately equal and each longer than 1st. *Thorax* (Text-fig. 13P), female 2·8 × 1·75 mm., strongly emarginate, sides rounded, converging from one third of the way from the base towards the apex, surface glabrous, finely shallowly but distinctly punctured, punctures along anterior edge almost obsolete ; femora with a small spine on the ventral surface, meso- and meta-thoracic tibiae very deeply emarginate, edge of emargination covered with stout setae. *Scutellum* as long as broad, cordiform with slightly extended shoulders, lightly shagreened, impunctate. *Elytra* broader than pronotum, basal area and humeri strongly raised and bounded behind by a deep transverse depression, longitudinally sulcate within the humeral calli, punctures large and deep within the transverse depression and on the median portion of the elytra, lighter on the basal area and towards the apices. Genitalia, female, Text-fig. 11E.

Holotype : female, " TERNATE ", i–iv.1858 (*A. R. Wallace*) ex Jacoby collection.

Paratype : female, " MOLUCCA ISLANDS ", date and collector unknown, in the Paris Museum ex. Lefèvre collection.

The holotype of *D. flebilis* has a Baly determination label with the name *Rhyparida nigripennis* Baly. I have not seen a syntype of *R. nigripennis*. However, the specimen does not fit Baly's original description which is definitely a species of *Rhyparida*. Therefore I consider it to be reasonable to presume that the specimen in the British Museum is of a different species to Baly's and to describe it as new.

This species is very close to *D. alternata*, but the pronotum is less heavily punctured and the sides of the frontoclypeus are strongly diverging. The thorax and head are light-coloured, the emargination of the eye is much reduced and the points of the triangular-shaped detached lateral arms of the prosternum are much more elongated.

Deretrichia separata (Baly) **comb. n.**
(Text-figs. 11C, 13 O)

Rhyparida separata Baly 1867 : 191.

♀ *Length* 3·8 mm. *Colour* rufo-fulvous, elytra, meso- and meta-thoracic sternites and abdomen black or almost black, apex of elytra tinged with rufo-fulvous, femora with diffuse black bands on the distal half, mandibles and distal 6 segments of antennae fulvous. *Head* shagreened, epicranium lightly, minutely and very obscurely punctate, an epicranial suture extending to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus distinct but shallow, frontoclypeus approximately as long as broad, with scattered, indistinct, shallow punctures, sides diverging slightly, anterior edge emarginate, emargination forming one sixth circumference of a circle, antennae reaching one third of the way down the elytra, 3rd segment short, 2nd longer than 3rd, 1st longer than 2nd, 4th longer than 1st, 5th–11th approximately equal and each longer than 1st but shorter than 4th. *Thorax* (Text-fig. 13O) 1·0 × 1·8 mm., pronotum with sides evenly rounded, strongly margined, surface distinctly and closely punctate, less so along the margins, interstices shagreened, a shallow, indistinct, chevron-shaped transverse depression just behind the anterior border ; tibiae very lightly ridged, femora with a small blunt tooth on the ventral surface one third of the way from the apex. *Scutellum* cordiform with a flat base, 0·3 mm. broad, 0·25 mm. long, lightly shagreened, impunctate. *Elytra* × 2·6 as long as thorax, wider than thorax, each basal area and humerus strongly raised and bounded by a very distinct transverse depression and humeral sulcus, slightly reduced on the basal area, strongly reduced on the posterior half of the elytra, vestigial at the apex, interstices flat and glabrous. Genitalia, female, Text-fig. 11C.

Lectotype : female, " BATCHIAN ", ix.1858–iv.1859 (*A. R. Wallace*). By present selection.

This species is very close to *D. semipunctata*, but smaller and the basal area is slightly less raised with deeper punctures. Within the transverse groove the punctures are more spaced out. The legs are unicolorous and the spermatheca is much slimmer (Text-fig. 11C).

Deretrichia semipunctata (Baly) **comb. n.**
(Text-figs. 11G, 13M)

Rhyparida semipunctatata Baly, 1867 : 169.

♀ *Length* 4·25 mm. *Colour* rufo-fulvous, elytra, meso- and meta-thoracic sternites and abdomen black or almost black, apices of elytra tinged rufo-fulvous, mandibles and antennal segments 1–5 black, segments 6–11 dark brown to black, other head appendages flavous. *Head* shagreened, epicranium lightly, minutely and very obscurely punctured, an epicranial suture extending to a point on a level with the back of the eyes, sutures between epicranium and frontoclypeus distinct but shallow, frontoclypeus about as long as broad with scattered, indistinct, shallow punctures, sides diverging anteriorly, anterior edge emarginate, emargination forming one fifth of the circumference of a circle, antennae reaching one third of the way down the elytra, 2nd segment short, 1st equal to 3rd and longer than 2nd, 4th longer than 1st, 5th–11th approximately equal and each longer than 1st but shorter than 4th. *Thorax* (Text-fig. 13M) 2·0 × 1·25 mm., pronotum with sides strongly margined and rounded, converging from one third of the way from the base towards the apex, surface distinctly and closely punctured, less so along the margins, interstices shagreened, a shallow, indistinct, chevron-shaped, transverse depression just behind the anterior border and extending across the disc ; femora with a blunt tooth on the mid-ventral surface, tibiae ridged. *Scutellum* cordiform with a flat base, 0·35 mm. broad, 0·3 mm. long, lightly shagreened, impunctate. *Elytra* × 2·3 as long as thorax, broader than thorax, basal area and humeri strongly raised and bounded behind by a transverse depression, deeply sulcate within the humeral calli, punctation deep and large within the transverse depression and humeral sulci, reduced on the basal area and posterior half of the elytra, vestigial at the apex, interstices flat and glabrous. Genitalia, female, Text-fig. 11G.

Lectotype : female, " BATCHIAN ", ix.1858–iv.1859 (*A. R. Wallace*), from the Baly collection. By present selection.

This species closely resembles *D. separata*, but is larger, the basal area is more raised and the sides of the pronotum are less evenly rounded. The punctures within the transverse depression of the elytra are much closer together so that adjacent ones appear to be almost confluent. The legs are unicolorous and the spermatheca is stouter (Text-fig. 11G).

Deretrichia variabilis (Baly)*

Rhyparida variabilis Baly, 1867 : 182.
Deretrichia variabilis (Baly) Weise, 1912 : 182.

This is the only species of *Deretrichia* of which the author has been unable to obtain specimens. It is therefore omitted from the key. From Baly's description it should clearly be included in the genus *Deretrichia*. Three colour varieties were included in his description. *D. variabilis* is broader and more finely punctured than *D. frontalis* and the elytra are more strongly excavated behind the basilar area (Baly 1867). As the original description was included by Baly (1867) in his " Phytophaga Malayana ", it is almost certain that the syntype series was collected NEW GUINEA, Dory, iv–vi.1858 (*A. R. Wallace*).

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A REVISION OF THE GENUS *CANDALIDES* AND ALLIED GENERA (LEPIDOPTERA: LYCAENIDAE)

G. E. TITE

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 14 No. 5
LONDON: 1963

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G. E. TITE

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Pp. 197–259 ; 4 *Plates* ; 119 *Text-figures*

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THE TRUSTEES OF
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A REVISION OF THE GENUS *CANDALIDES* AND ALLIED GENERA (LEPIDOPTERA: LYCAENIDAE)

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SYNOPSIS

The omnibus genus *Candalides* is divided into seven genera on structural characters. Keys to the species of the genera *Holochila*, *Erina*, and *Philiris* are provided. The synonymy is revised, and two new genera, twenty-nine new species and eleven new subspecies are described.

INTRODUCTION

THE genus *Candalides* has in the past been used to contain an assembly of varying degrees of affinity (Grünberg in Seitz 1921 : 849), including some that are best excluded from the group entirely. Druce (1897 : 14) stated that the generic name *Holochila* could not be used on the grounds that it was preoccupied, but did not cite the prior use of the name. A search has revealed the mammalian name *Holochilus* Brant (1835), and it is presumed that Druce thought *Holochila* was a homonym of that name ; in fact, a one-letter difference in a generic name disposes of the homonymy (Int. Code zool. Nomencl., Article 56, para (a)), and the name is valid. Druce noted the greater length of the third subcostal vein of the fore wing (vein 9) in *Holochila absimilis* and its allies, but considered it insufficient to warrant generic separation from *Candalides*. Bethune-Baker (1904 : 369) stated that he could find no structural difference between the genera *Candalides* and *Philiris*. Waterhouse (1903 : 177) and (1914 : 77) retained the genus *Philiris* for the *ilias* group, and used *Candalides* for the *xanthospilos*, *erinus*, *heathi*, and *absimilis* groups ; at the same time pointing out that each of these groups represented a natural division of the genus. His suggestions are in general agreement with the generic grouping adopted in the present paper. Investigation of the material in the British Museum (Natural History) proves beyond doubt that the genera *Candalides*, *Holochila* and *Philiris* can be separated on structural characters, and that the first named must be further restricted by the removal of *cyprotus*, and the *erinus* and *heathi* groups. All these form homogeneous and natural groups of species, each differing from the others in structure, shape, and appearance. The proportional length of the stalk of veins 7 and 9 on the fore wing, the course of vein 12, and the relative proportions of the labial palpi, all provide significant characters. In dealing with the labial palpi it has been found convenient to denude them of scales, and to consider the naked organs only.

In the genus *Philiris* there is great difficulty in correlating the sexes ; many of the males are superficially so similar, that they can only be specifically identified with certainty by the examination of the genitalia. In the majority of cases the almost unmarked white undersides, and the sexually dimorphic uppersides, do not provide characters common to both sexes. Further confusion has arisen by the action of some authors in describing females and assigning them to the wrong species. An attempt is here made to group the sexes, taking into account characters common to both sexes where they occur, and considering the whole material from each locality separately ; obviously this can only be looked upon as a tentative solution of the problem. With all this in mind, it has not been considered desirable to found subspecies on characters obtaining in the female sex only.

Detailed description of every species has not been attempted, as the characters included in the keys, the text-figures and plates, and the works of authors cited, should provide sufficient means of identification. Where measurements of the length of the fore wing are given, they represent the distance between the base and apex of the wing ; in view of the considerable variation in size in most species of butterflies, they can only serve as a rough guide, and they are only given in those cases in which it is considered that, in conjunction with other characters, they do aid identification.

It should be noted that Jordan (1930 : 60) pointed out that the species from Owgarra, British New Guinea, described by Bethune-Baker (1906 : 100–101) came actually from the nearby Angabunga River ; he made no reference to pages 102–104 on which Bethune-Baker describes four more species from Owgarra. In the present work the locality is quoted as given by Bethune-Baker.

Citations of data and numbers of specimens following the words " Other material" or "Distribution" refer to specimens in the B.M. (N.H.) which have been examined. The word (Type !) after a reference indicates that the type has been examined.

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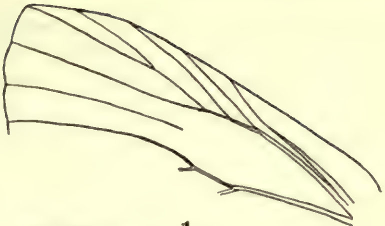

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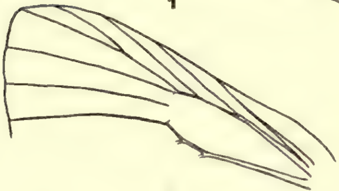

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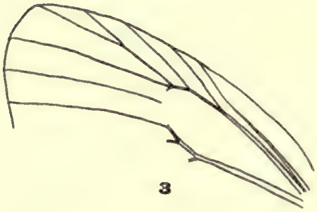

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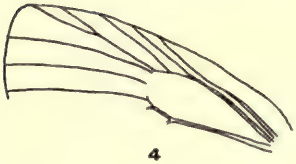

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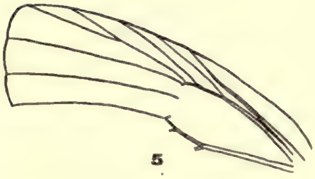

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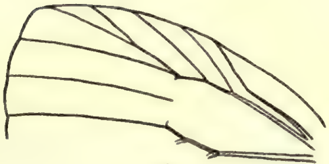

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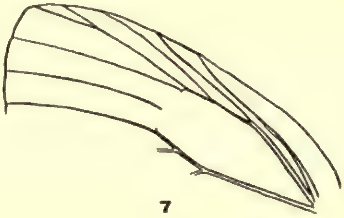

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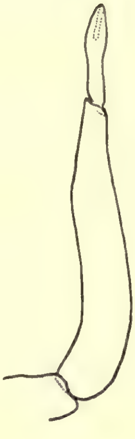

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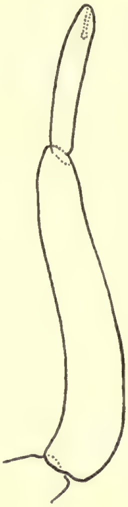

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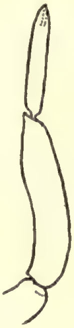

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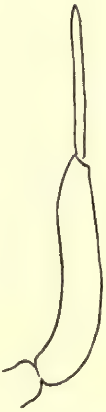

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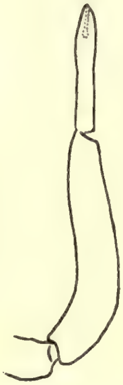

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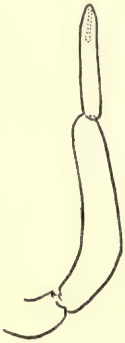

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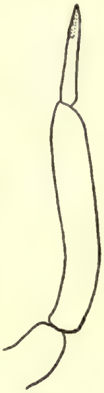

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FIGS. 1–7. neuration of forewing : 1, *Holochila absimilis* ; 2, *Cyprotides cyprotus* ; 3, *Candalides xanthospilos* ; 4, *Erina erina* ; 5, *Microscena heathi* ; 6, *Adaluma urumelia* ; 7, *Philiris ilias*.

FIGS. 8–14. labial palpi : 8, *Holochila absimilis* ; 9, *Cyprotides cyprotus* ; 10, *Candalides xanthospilos* ; 11, *Erina erina* ; 12, *Microscena heathi* ; 13, *Adaluma urumelia* ; 14, *Philiris ilias*.

KEY TO THE GENERA

1 Discoidal cell of the fore wing extends less than half-way to the margin. It is shorter than vein 6 2

– Discoidal cell of the fore wing extends more than half-way to the margin. It is at least equal in length to vein 6 5

2 The antennae are very short, less than half the length of the fore wing costa **ADALUMA** (p. 221)

– The antennae are longer, never less than half the length of the fore wing costa . 3

3 Distal margin of the fore wing is convex between the veins, giving a scalloped effect. Stalk of veins 7 and 9 only one third the distance between its origin and the end of vein 7. Vein 12 is angled at its nearest point to the base of vein 11 **HOLOCHILA** (p. 202)

– Distal margin of fore wing not convex between the veins. Stalk of veins 7 and 9 just under half the distance between its origin and the end of vein 7. Vein 12 not angled 4

4 Distal margin of fore wing is slightly angled at vein 4 . . **CYPROTIDES** (p. 213)

– Distal margin of fore wing is rounded . . . . . **MICROSCENA** (p. 219)

5 Distal margin of hind wing is concave between the veins. Stalk of veins 7 and 9 is more than half the distance from its origin to the end of vein 7 **PHILIRIS** (p. 222)

– Distal margin of the fore wing is not concave. Stalk of veins 7 and 9 is less than half of the distance between its origin and the end of vein 7 6

6 The terminal segment of the labial palp is not sharply pointed ; it is more than two-thirds the length of the penultimate segment . . **CANDALIDES** (p. 215)

– The terminal segment of the labial palp is sharply pointed and slender ; it is only half the length of the penultimate segment . . . . **ERINA** (p. 216)

HOLOCHILA Felder

Holochila Felder, 1862 : 490. Type species : *Holochila absimilis* Felder.

The terminal segment of the labial palp is only about one-third the length of the middle segment, whereas, that of *Candalides* is almost two-thirds the length of its middle segment. The fore wing distal margins are distinctly convex between the veins, giving the wing a scalloped effect ; the hind wing outline is more regular, but is slightly produced at the anal angle. On the fore wing, the stalk of veins 7 and 9 extends to one-third of the distance between its point of origin and the end of vein 7 ; it is always shorter in proportion than is its counterpart in *Candalides*. Vein 12 is nearest to vein 11 at the point of origin of that vein ; it then bends sharply upwards, increasing its distance from vein 11 as it approaches the costa. These veins in *Candalides* are almost parallel.

KEY TO THE SPECIES OF *HOLOCHILA*

MALES

1 Underside hind wing, the median spot 6 is immediately below or inwards of spot 7. Clasper, simple, angled at two-thirds its length, terminating in a point . . 2

– Underside hind wing, the median spot 6 is in line with spots 5 and 7. Clasper, complex, never as in 2 5

2 Upperside fore wing, the veins are not thickened by scent scales 3

– Upperside fore wing, the veins are always thickened by scent scales. . . . 4

3 Upperside, bright blue with a deep blue refractive gloss. Underside, pattern weakly marked, the fore wing median series of spots is very close to the submarginal lunules . . . . *tringa* (p. 205)

– Upperside, as in *tringa*. Underside, pattern heavily marked, the fore wing median series of spots well removed from the submarginal lunules . . ***biaka*** (p. 205)
4 Upperside, slate-blue, fore wing apex not noticeably produced . ***margarita*** (p. 204)
– Upperside, pale lavender-blue, fore wing apex is noticeably produced . ***gilberti*** (p. 205)
5 Clasper, forked, the inner arm being very long and directed transversely . . 6
– Clasper, not forked, or if forked the two arms are of approximately equal length . 17
6 Underside pattern, lightly marked . . . 7
– Underside pattern, heavily marked . . . 13
7 Upperside, bright greenish blue . . . 8
– Upperside, not greenish blue . . . 9
8 Upperside, margins wide . . . ***dimorpha dimorpha*** (p. 206)
– Upperside, margins narrow . . . ***dimorpha helenita*** (p. 206)
9 Upperside, copper-coloured . . . ***cuprea*** (p. 206)
– Upperside, not copper-coloured . . . 10
10 Upperside, dull slate-blue . . . ***ardosiacea*** (p. 206)
– Upperside, not slate-blue . . . 11
11 Upperside, purple-blue, changing by refraction to reddish purple . ***limbata*** (p. 207)
– Upperside, not purple blue . . . 12
12 Upperside, turquoise-blue . . . ***riuensis*** (p. 208)
– Upperside, black, with a rich purple suffusion over most of the wing . ***pruina*** (p. 208)
13 Upperside, white, with a strong metallic green basally and on the thickened veins of the fore wing ; margins widely black. . . . ***viriditincta*** (p. 209)
– Upperside, some shade of purple or slate blue . . . 14
14 Upperside, bright purple-blue basally, the thickened veins being deep blue ; margins widely black . . . ***neurapacuna*** (p. 209)
– Upperside, not bright purple-blue ; margins narrowly black . . . 15
15 Upperside, slate-purple . . . ***meforensis*** (p. 207)
– Upperside, slate-blue . . . 16
16 Upperside, slate-blue with a refractive greenish reflection . . ***silicea*** (p. 207)
– Upperside, slate-blue with no refractive greenish reflection . . ***lamia*** (p. 208)
17 Clasper, forked, the forks being long and approximately equal in length.Upperside, dusty mauve . . . ***subrosea*** (p. 210)
– Clasper, not forked. Upperside, blue or slate-blue . . . 18
18 Upperside, blue. Underside, heavily marked, the markings sandy brown in colour, the fore wing median band is broad and continuous ; base of hind wing often suffused with sandy scales . . . ***grandissima*** (p. 211)
– Upperside, slate-blue or slate-purple. Underside, weakly marked, the markings blackish fuscous 19
19 Upperside, slate-purple, the scent scales extend between the veins of the fore wing to form a rounded patch . . . ***consimilis*** (p. 213)
– Upperside, slate-blue, the scent scales restricted to the veins of the fore wing ***absimilis*** (p. 211)
and? ***persimilis*** (p. 213)

FEMALES

1 Underside hind wing, the median spot 6 is immediately below or inwards of spot 7 2
– Underside hind wing, the median spot 6 is in line with spots 5 and 7 5
2 Upperside, mainly pale lavender-blue . . . 3
– Upperside, fuscous with a large white area on each wing, the fore wing basally bluish 4
3 Upperside, fore wing dusky costal margin does not extend into the cell, the veins on all wings not darkened, hind wing not clouded with dusky scales ***gilberti*** (p. 205)
– Upperside, fore wing dusky costal margin extends over most of the cell, the veins on all wings darkened, hind wing clouded with dusky scales . . ***biaka*** (p. 205)

4 Upperside, the veins crossing the white areas are black . . . . ***tringa*** (p. 205)
– Upperside, the veins crossing the white areas are white . . ***margarita*** (p. 204)
5 Upperside, predominantly some shade of green, blue, or black 6
– Upperside, predominantly black and white 11
6 Upperside, predominantly black 7
– Upperside, predominantly some shade of green or blue 8
7 Upperside, fore wing with a greyish streak above the median vein, widening and becoming lighter grey in the disc . . . . . . ***pruina*** (p. 208)
– Upperside, fore wing with a much wider lavender streak, widening in the disc, hind wing fuscous black laved with lavender . . . . . . ***lamia*** (p. 208)
8 Upperside, all wings smoky grey-blue . . . . . ***meforensis*** (p. 207)
– Upperside, all wings not smoky grey-blue 9
9 Upperside, fore wing pale green-blue, turning to whitish in the disc. Hind wing green-blue darkened by fuscous scales . . . . . . ***silicea*** (p. 207)
– Upperside, all wings blue or lavender 10
10 Upperside all wings brilliant blue . . . . . . ***riuensis*** (p. 208)
– Upperside all wings, very pale whitish lavender merging into fuscous margins ***coerulea*** (p. 210)
11 Underside, heavily marked, the markings being sandy brown. Base of hind wing often suffused with sandy scales . . . . . . ***grandissima*** (p. 211)
– Underside, lightly marked, the markings being blackish or dusky brown. Base of hind wing not suffused 12
12 Upperside, the white areas on all wings suffused with metallic green scales ***viriditincta*** (p. 209)
– Upperside, the white areas on all wings not suffused with metallic green scales . 13
13 Upperside, fore wing black with rounded white area in the disc. Hind wing, the pale area is distinctly blue . . . . ***consimilis*** (p. 213)
– Upperside, black all wings with a rounded white area, and usually some blue scaling at their bases 14
14 Upperside hind wing, the white area never reaches the costa . ***absimilis*** (p. 211)
– Upperside hind wing, the white area always reaches the costa 15
15 Underside all wings, the markings clear-cut and all series complete ***neurapacuna*** (p. 209)
– Underside all wings, the markings faint and often partially obsolete . . . 16
16 Upperside, blue basal scaling restricted on the fore wing ; entirely absent on the hind wing . . . . ***cuprea*** (p. 206)
– Upperside, blue basal scaling present on all wings 17
17 Upperside, the white area on the fore wing large, extending well over vein 5 ***ardosiacea*** (p. 206)
– Upperside, the white area on the fore wing small, never extending over vein 5 ***helenita*** (p. 206)

Holochila margarita Semper

(i) ***H. margarita margarita*** Semper
(Text-figs. 15, 16 and 19)

Holochila margarita Semper, 1879 : 161, Bowen (Type !).
Holochila helenita Semper, 1879 : 162 (♀ allotype ! nec. ♂ type !).

Represented in the B.M. (N.H.) by Semper's type, which is labelled " Bowen ", and by a series of 21 ♂, and 12 ♀, extending from Northern Queensland to Sydney.

(ii) ***H. margarita maria*** (Bethune-Baker) **comb. n.**
(Text-fig. 20)

Candalides maria Bethune-Baker, 1908 : 120, Aroa River (Type !).

The male is superficially not to be distinguished from the nominate subspecies, and its genital armature only differs in the proportionately larger size of the male clasp. The female exhibits a great reduction in the extent of the white patch on each wing.

Distribution, MYSOL ; ARU ; WAIGEU ; NEW GUINEA.

Holochila gilberti (Waterhouse) **comb. n.**
(Text-fig. 21)

Candalides gilberti Waterhouse, 1903 : 181, Port Darwin.
Candalides gilberti Waterhouse ; Waterhouse, 1932 : 129, pl. 19, figs. 3–3a.

Besides the characters given in the key, this species can be identified by the sharp black spotting on the underside, and by the distinct angle at vein 5 in the median band of the fore wing. Surprisingly, in spite of these external differences and the very distinct female, the male genitalia are identical with those of *margarita*.

Distribution, AUSTRALIA : Port Darwin xii.1909, (*Dodd*) 1 ♂, 3 ♀ ; Adelaide River, ix–iv.1891–2, (*J. J. W.*), 1 ♂ ; Queensland (without further details) 2 ♂, 2 ♀. The accuracy of the last named is in doubt.

Holochila tringa Grose-Smith
(Text-figs. 17, 18, and 22)

Holochila tringa Grose-Smith, 1894 : 581, Humboldt Bay (Type !).
Holochila tringa Grose-Smith ; Grose-Smith & Kirby, 1896, pl. 9, figs. 1 and 2.

Distribution, NEW GUINEA.

Holochila biaka **sp. n.**
(Pl. 1, figs. 120–121, Pl. 2, figs. 131–132. Text-fig. 23)

The relationship of this insect with *H. tringa* provides another example of the interesting phenomenon—to be found elsewhere in this genus—of two species closely connected by the structure of the male genitalia, although exhibiting slight but constant external differences in the male, and wide divergencies in both colour and wing pattern in the female.

On the upperside, the male is confusingly like that of *tringa*, exhibiting the same bright blue colouring, with a deep blue gloss, which is more intense on the fore wing, but with much narrower dark margins on all wings. The fore wing of the female is pale lavender ; which colour extends from the base, through the lower third of the cell, and fills areas 1, 2, and 3, until it merges gradually with the roughly 3 mm. wide grey-black distal margin. A wider grey-black band covers the costal portion of the wing, that also merges gradually with the lavender area. On the hind wing the lavender has a somewhat smoky appearance, resulting from an admixture of dusky scales ; the grey-black areas are much lighter than those of the fore wing, and fill the whole area from the hindmargin to the diffuse marginal band from vein 4 to vein 7, and the costal area. A dusky thread-like streak closes the cell, and all the veins are perceptibly darkened. Both sexes on the underside are decidedly whiter than *tringa*, and all the dark markings are heavier and more clearly marked, the median row on the fore wing is situated farther from the margin, and is distinctly angled at vein 6 in the male. The male clasp is shorter and stouter than in *tringa*.

Holotype ♂, SCHOUTEN ISLANDS : Biak, vi.1914 (*Pratt Bros.*), B.M. Type No. Rh. 16794.

Allotype ♀, as holotype, B.M. Type No. Rh. 16795.

Other material, as holotype, 1 ♂.

Holochila helenita Semper

(i) ***H. helenita helenita*** Semper

(Text-fig. 24)

Holochila helenita Semper, 1879 : 162, Cape York (Type !), ♂ nec ♀.
Holochila androdus Miskin, 1890 : 41, Cape York.
Holochila subargentea Grose-Smith & Kirby, 1896, pl. 9, figs. 9–10, Cape York.

Examination of Semper's female allotype leaves no doubt that it is an example of *H. margarita*.

Distribution, AUSTRALIA : Cape York to Sydney.

(ii) ***H. helenita dimorpha*** (Röber) **comb. n.**

(Text-fig. 35)

Plebeius dimorphus Röber 1886 : 62, Eastern New Guinea.

Distribution, MYSOL ; WAIGEU ; JOBI ; NEW GUINEA.

Holochila cuprea (Röber) **comb. n.**

(Text-fig. 25)

Plebeius dimorphus var. *cupreus* Röber, 1866 : 62, N.W. New Guinea.

Distribution, NEW GUINEA.

Holochila ardosiacea **sp. n.**

(Pl. 1, figs. 122–123, Pl. 2, figs. 133–134. Text-fig. 26)

In the male there is a marked resemblance to that sex of *H. margarita maria* which comes from the same geographical area ; it only differs by possessing a smooth greyish tint to the slate-blue ground colour, and by the thickened veins of the fore wing being clearly perceptible no matter what the angle of light or view ; these characters are so subtle that they only became apparent when the two series were separated by means of the position of the median spots on the underside of the hind wing, mentioned in the key. The blackish marginal line is thread-like, though somewhat thickened as it approaches the hind angle of the hind wing. The female can be distinguished from that of *dimorpha* by the round whitish area on the fore wing, which extends over vein 5 and well into the basal portion of the cellule above. The underside of both sexes is not distinguishable from that of *dimorpha*.

Holotype ♂, British New Guinea : Upper Aroa River, ii.1903 (*A. S. Meek*), B.M. Type No. Rh. 16796.

Allotype ♀, as holotype, B.M. Type No. Rh. 16797.

Other material, Aru ; New Guinea.

Holochila limbata **sp. n.**

(Pl. 1, fig. 130, Pl. 2, fig. 141. Text-fig. 27)

The upperside is darker than in any of the other blue species in the genus ; as stated in the key, the colour changes from purple-blue to reddish purple by refraction ; on the hind wing above vein 7 there is a diffuse oval whitish area. All wings are heavily margined by a black band of over 1 mm. in breadth, widening to over 2 mm. at the apex of the fore wing. The veins are darkened by the presence of blackish scales ; their androconial thickening is confined to the median vein and the bases of its branches, and is not readily observable unless the insect is viewed against the light. The underside is like that of *dimorpha*.

Holotype ♂, Dutch New Guinea : Snow Mountains, Near Oetakwa River, up to 3500′, x–xii.1910 (*A. S. Meek*), B.M. Type No. Rh. 16798.

Other Material, Dutch New Guinea : 2 Days N. of Fak Fak, xii.1907, 1700′ (*A. E. Pratt*), 1 ♂.

Holochila silicea Grose-Smith

(Text-fig. 28)

Holochila silicea Grose-Smith, 1894 : 580, Biak, Schouten Islands (Type !).
Holochila silicea Grose-Smith ; Grose-Smith & Kirby, 1896, pl. 9, figs. 6–7.

Recognizable in the male by the peculiar greenish tinge of the slate-blue ground, and in the female by the blue-grey patch of the fore wing also having a greenish tinge.

Distribution, Dutch New Guinea : Geelvink Bay : Schouten Islands ; Mefor Island.

Holochila meforensis **sp. n.**

(Pl. 1, figs. 124–125, Pl. 2, figs. 135–136. Text-fig. 29)

Slate-purple in the male above, all the wings are margined with a fine fuscous line, the fringes are fuscous at the base, and white in the outer portion. The female is predominantly smoke blue-grey ; which colour merges into the wide costal and distal margins on all wings, extending on the fore wing as a smoky suffusion well into the dusky costal band, just below the apex. On the hind wing there is an indefinite whitish area situated between veins 6 and 7. The underside in both sexes is rather sordid white, blue scaled at the base of the hind wing, and with all the markings peculiar to the genus sharply defined in brownish fuscous.

Holotype ♂, Dutch New Guinea : Geelvink Bay, Mefor Island, Suer, v–vi.1897 (*W. Doherty*), B.M. Type No. Rh. 16799.

Allotype ♀, as holotype, B.M. Type No. Rh. 16800.

Other material, Dutch New Guinea : as holotype 2 ♀ ; Mefor Island, viii.1920 (*Pratt Bros.*), 1 ♂, 3 ♀.

Holochila riuensis sp. n.

(Pl. 1, figs. 126–127, Pl. 2, figs. 137–138. Text-fig. 30)

Like the two preceding species, this is insular, quite isolated from its congeners by external characters, and exhibiting slight but constant genitalic differences. All wings in the male are turquoise-blue, with narrow black margins, and white edged fringes. The costal area above vein 7 of the hind wing is greyish. On the female fore wing, a bright blue patch occupies the greater part of the wing ; this spreads from the base over the cell, and well into the bases of areas 1 to 5, its distal limits rounded and reaching to within 2 mm. of the wing margin. The black remainder of the wing takes the form of a wide continuous band extending the length of the costa, the distal margin, and in a wedge form along the outer half of the hind margin. The hind wing is pale blue—considerably sullied by a sprinkling of black scales—and margined by black to a width of 1 mm. A vague whitish wedge fills the space between veins 6 and 7 ; the costal region is greyish-black, and all the veins are blackened. On the underside, the ground is satin-white, with some blue-green scaling at the base of the hind wing. The dark markings are all present, but extremely fine and hair-like. The median series on the fore wing is very close to the submarginal lunules.

Holotype ♂, LOUISIADE ARCHIPELAGO : Sudest Island, Mount Riu, 2000′, iv.1916 (*Eichhorn Bros.*), B.M. Type No. Rh. 16801.

Allotype ♀, as holotype, B.M. Type No. Rh. 16802.

Other material, LOUISIADE ARCHIPELAGO : Sudest Island (*Eichhorn Bros.*), and (*Meek*), 7 ♂, 9 ♀.

Holochila lamia Grose-Smith

(Text-fig. 32)

Holochila lamia Grose-Smith, 1897 : 179, Fergusson I. (Type !) ♂.
Holochila lamia Grose-Smith ; Grose-Smith & Kirby, 1898, pl. 13, figs. 1–3, Fergusson I., ♂ ♀.

This slate-blue species is easily recognized by the strongly marked underside pattern, and by the greyish-white colour between the base and the median series of striae on that surface. The female is very like that of *H. silicea*, but the patch on the fore wing above is blue. Males from Goodenough Island are identical with those from the type locality ; in the females, however, the patches on the fore wing are paler blue, and the hind wing ground colour is pale grey-blue, in contrast to the very dusky shade of the female allotype. Until more material becomes available, it would be rash to suggest subspecific separation on these grounds.

Distribution, D'ENTRECASTEAUX ARCHIPELAGO : Fergusson Island, xii. 1894 (*A. S. Meek*), 3 ♂ 1 ♀ (including types) ; Goodenough Island, 2500–4000′, iv–v. 1913 (*A. S. Meek*), 7 ♂, 3 ♀.

Holochila pruina (Druce) comb. n.

(Text-fig. 31)

Candalides pruina Druce, 1904 : 140, Aroa River (Type !).
Candalides pruina Druce ; Joicey & Talbot, 1916*a* : 81, Wandammen Mountains, ♀ (Neallotype !).

The male is quite distinctive : the black upperside with the large purple area on the fore wing makes it unlike any other species. No geographical differences can be detected in this sex. Joicey & Talbot describe the upperside of the female fore wing as follows : " ♀. Wings more rounded, ground-colour a little paler. Fore wing with a narrow whitish median stripe, tinged with pale blue and extending from the base along the lower edge of the cell to halfway between cell and margin, being much broader beyond the cell ". This aptly describes the female neallotype, the only example from Wandammen Mountains, but examples from British New Guinea, Mondo River in Mandated New Guinea, and Oetakwa River and Weyland Mountains in Dutch New Guinea, all exhibit a rather nebulous greyish median stripe of individually variable extent and never exceeding in size the blue tinged white stripe of the Wandammen example. Two females from the Arfak Mountains have a stripe, narrow and blue scaled at the base, but widening into an extensive white oval patch in the centre of the wing. A smaller somewhat obscured patch is present in the apical area between vein 6 and the costa on the hind wing. These facts suggest a geographical distribution of races, only recognizable in the female, but the material at hand is not sufficient to substantiate this.

Distribution, NEW GUINEA.

Holochila neurapacuna (Bethune-Baker) **comb. n.**

(Text-fig. 34)

Candalides neurapacuna Bethune-Baker, 1908 : 121, pl. 9, fig. 10, Angabunga River (Type !).

Rothschild (1915 : 30) described what he supposed was the female of this species from two male examples of the species described below as *viriditincta* ; one of them —a discoloured greyish insect—bears a label : " Candalides ? sp. perhaps female of *C. neurapacuna* Beth.-Baker ". These two insects are not otherwise mentioned in the report, and there are certainly no other *Candalides* or *Holochila* amongst the material collected by the expedition to which the description could possibly apply.

The true female is represented in the B.M. (N.H.) by a single specimen from the type locality ; its upperside is very like that of the same sex of *H. helenita*. On the underside, the brown markings are arranged on the silver-white ground exactly as in Bethune-Baker's male type, and leave no doubt of its relationship.

Neallotype ♀, BRITISH NEW GUINEA : Angabunga River, 6000′ upwards, xi–ii. 1904–5 (*A. S. Meek*), B.M. Type No. Rh. 16870.

Other material, BRITISH NEW GUINEA : Aroa, Mambare, and Angabunga Rivers (*Meek*), 7 ♂ (including holotype). MANDATED NEW GUINEA : West of Herzog Mountains, Edie Creek (*A. E. Eichhorn*) 1 ♂.

Holochila viriditincta **sp. n.**

(Pl. 1, figs. 128–129, Pl. 2, figs. 139–140. Text-fig. 33)

Candalides neurapacuna Bethune-Baker ; ♀ Rothschild, 1915 : 30, Snow Mountains.

Predominantly white in the male above, suffused with pale metallic green ; a narrow black costal marginal band is continuous with the wide black distal margin, which is 5 mm. wide at the apex, and narrows to 2 mm. at vein 1. The basal portions of the veins of the fore wing are thickened by the presence of pale metallic green scales, those on veins 5, 6 and 7, forming a three pronged incursion into the black distal band. On the hind wing, the metallic green does not extend above vein 6, leaving the apical area clear white. The base of the costa is suffused with blackish, and there is a linear dark distal margin ; all the veins are darkened.

In the female, the black costal margin of the fore wing gets progressively wider, its lower edge merging with the distal margin in a sweeping curve ; the centre of the wing is clear white, and the remainder is white suffused with metallic green. The hind wings are less heavily suffused with green than are those of the male, but are otherwise very similar. The underside in both sexes is identical with that of *neurapacuna*.

Holotype ♂, DUTCH NEW GUINEA : Weyland Mountains, Menoo Valley, Mount Kunupi, 6000′, xii–i.1920–1 (*Pratt Bros.*), B.M. Type No. Rh. 16803.

Allotype ♀, as holotype, B.M. Type No. Rh. 16804.

Other material, DUTCH NEW GUINEA : as holotype, 5 ♂, 13 ♀ ; Menoo Valley, 3600–5000′, xi–i.1920–21 (*Pratt Bros.*), 9 ♂ ; Snow mountains, Utakwa River, 4–6000′, i–ii.1913 (*A. F. R. Wollaston*), 2 ♂.

Holochila coerulea (Röber)

(i) ***H. coerulea coerulea*** (Röber)

Plebeius dimorphus var. *coeruleus* Röber, 1886 : 62, Aru.

The underside markings in both sexes show a marked tendency to obsolescence. All the marginal spots are very small.

Distribution, ARU.

(ii) ***H. coerulea subrosea*** Grose-Smith **comb. n.**

(Text-figs. 46, 47)

Holochila subrosea Grose-Smith, 1894 : 580, Humboldt Bay (Type !).
Holochila subrosea Grose-Smith ; Grose-Smith & Kirby, 1896, pl. 9, figs. 3, 4 and 5.

The underside pattern is clearly evident, and the marginal spots are larger than those of the nominate subspecies.

Distribution, NEW GUINEA : Humboldt Bay.

(iii) ***H. coerulea doreia*** **ssp. n.**

The male is distinctly deeper slate-blue than either of the other subspecies. In the female, the dusky parts of the wings are darker, and tend to restrict and obscure the blue-grey areas. The underside in both sexes is distinguished by the large size of the marginal spots on all wings ; these spots are always distinctly larger than those of *subrosea*.

Holotype ♂, DUTCH NEW GUINEA : Dorey Bay, iv–v.1909 (*Pratt. Bros.*), B.M. Type No. Rh. 16805.

Allotype ♀, DUTCH NEW GUINEA : Dorey (*Doherty*), B.M. Type No. Rh. 16806.

Other material, DUTCH NEW GUINEA : Dorey Bay (*Pratt Bros.*), 21 ♂, 1 ♀ ; Dorey, vi.1897 (*W. Doherty*), 1 ♂, 3 ♀ ; Dorey, 1 ♂, 2 ♀ ; South Geelvink Bay, Wangaar, ii.1921 (*Pratt Bros.*), 1 ♀ ; Geelvink Bay, Coast District, xi.1914 (*Pratt Bros.*), 1 ♀ ; Mt. Goliath, iii.1911 (*A. S. Meek*), 1 ♂.

Holochila grandissima (Bethune-Baker) **comb. n.**

(i) ***H. grandissima grandissima*** (Bethune-Baker)

(Text-figs. 38, 39)

Candalides grandis Bethune-Baker, 1906 : 102, Owgarra (Type !).
Candalides grandissima Bethune-Baker ; Bethune-Baker, 1908 : 121, Owgarra, n. n. for *C. grandis*.
Candalides grandissima Bethune-Baker ; Grünberg (in Seitz), 1921 : 851 [nec fig. 145g].

The figures in Seitz of *grandissima* represent *Philiris griseldis gisella* (Staudinger).

Distribution, BRITISH and MANDATED NEW GUINEA.

(ii) ***H. grandissima morobea*** (Wind & Clench) **comb. n.**

Candalides grandissima morobea Wind & Clench, 1947 : 4, Morobe District, Mandated New Guinea.

There are no specimens available for study in the B.M. (N.H.).

Holochila absimilis Felder

(Text-figs. 8, 36, and 37)

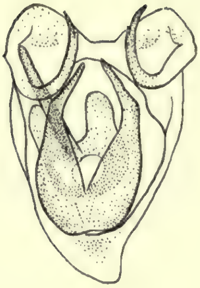
Holochila absimilis Felder, 1862 : 490, Ash I. (Type !).
Candalides absimilis (Felder) Waterhouse, 1932 : pl. 19, figs. 1–1a.
Candalides absimilis (Felder) ; Waterhouse, 1942 : 123.

With the material in the B.M. (N.H.) it has not been found possible to separate this species from *persimilis* Waterhouse. Waterhouse founded *persimilis* on a slight difference in the male clasps, some slight differences in the male wing colour, and the appearance of the sex marks on the fore wing.

The examination of a large number of preparations leads to the conclusion that the difference he observed in the clasps, if not individual variations, may have been the result of the varying positions of the organs concerned, or of cover glass pressure ; this is borne out by the fact that in more than one of the preparations made, one of the clasps appears to represent *absimilis* (*sec.* Waterhouse), while the other represents *persimilis*. External geographical differences are observable : males from the Cooktown, Cairns, Kuranda area in Northern Queensland are more blue above, and the black tornal spot on the hind wing beneath shows a tendency to increased size : females from this area exhibit a much greater expanse of white on the upperside of the hind wing, extending from vein 2 to vein 7, whereas that of examples from Brisbane and New South Wales extends only from halfway between veins 3 and 4 to vein 7. Males from Mackay are like the more northern ones from Cooktown, but Mackay females resemble more closely those from Brisbane.

Further elucidation of the problem would best be conducted by a worker in the field who could study the live insects and their early stages. For the time being, therefore, it is proposed to treat all the material as *absimilis*, and to leave the question of the status and identity of *persimilis* until further evidence is available.

Distribution, AUSTRALIA : Queensland, and New South Wales.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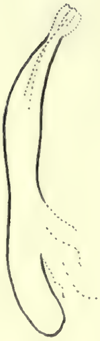
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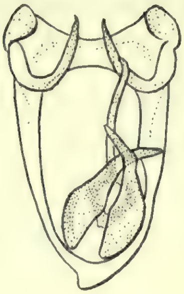
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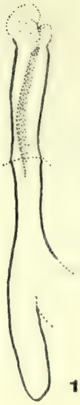
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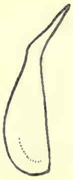
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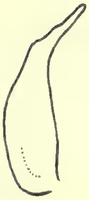
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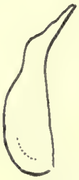
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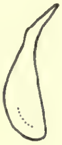
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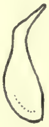
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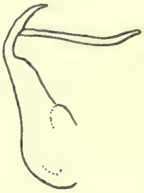
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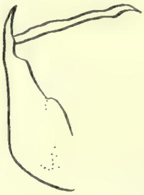
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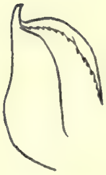
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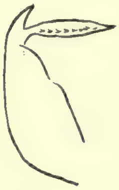
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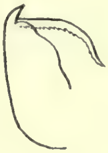
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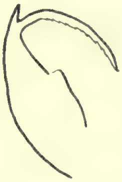
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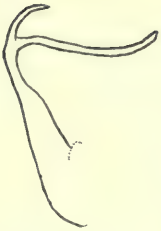
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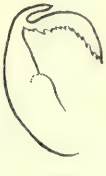
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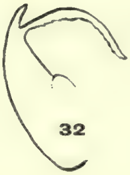
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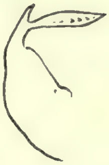
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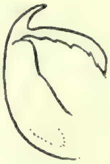
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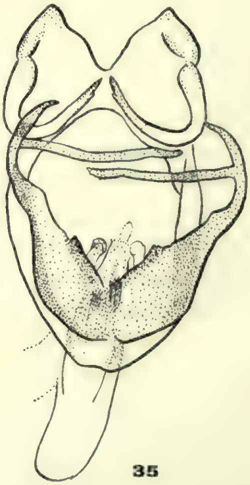
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Holochila persimilis (Waterhouse) **comb. n.**

Candalides persimilis Waterhouse, 1942 : 123, Mackay, Queensland.

The identity of this species is uncertain. (See *absimilis.*)

Holochila consimilis (Waterhouse) **comb. n.**

(Text-figs. 40, 41, and 42)

Candalides consimilis Waterhouse, 1942 : 124, Sydney.
Candalides consimilis Waterhouse ; Smales & Ledward, 1943 : 48, early stages.

Besides the characters mentioned in the key, this insect may be recognized in both sexes by the produced and somewhat pointed anal angle of the hind wing.

Distribution, AUSTRALIA : Sydney and Brisbane.

CYPROTIDES **gen. n.**

(From *cyprotus*, name of type species with suffix ides masc.)

Type : *Chrysophanus cyprotus* Olliff.

The terminal segment of the labial palp is approximately half the length of the middle segment and is of even width throughout, whereas that of *Holochila* is constricted below its centre and very much shorter. The fore wing distal margin is not scalloped, but is slightly angled at vein 4. Veins 7 and 9 arise from a common stalk which is under half but much more than one third the distance between the origin of the stalk and the end of vein 7. Vein 12 is straighter than that of *Holochila* and does not approach vein 11 so closely. In the male, the hind wing is distinctly produced and pointed at the anal angle. Androconial scales are present on the median and submedian veins of the fore wing, as in most *Holochila* species.

Cyprotides cyprotus (Olliff) **comb. n.**

(i) ***C. cyprotus cyprotus*** (Olliff) **comb. n.**

(Text-figs. 2, 9, 48, 49 and 50)

Chrysophanus cyprotus Olliff, 1886 : 716, New South Wales.
Holochila purpurea Grose-Smith & Kirby, 1897 : 7, pl. 10, figs. 11–12, Sydney (Type !).
Holochila purpurea Grose-Smith & Kirby ; (as synonym of *C. cyprotus* Olliff) Waterhouse 1902 : 333.

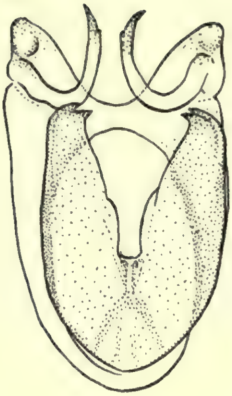
Waterhouse (1928) records that *cyprotus* from Sydney is single brooded.

Distribution, AUSTRALIA : New South Wales.

FIGS. 15, 17, 35. ♂ genital armature : 15, *Holochila margarita ;* 17, *H. tringa ;* 35, *H. dimorpha.*

FIGS. 16 and 18. aedeagus : 16, *Holochila margarita ;* 18, *H. tringa.*

FIGS. 19–34. ♂ clasper : 19, *Holochila margarita ;* 20, *H. maria ;* 21, *H. gilberti ;* 22, *H. tringa ;* 23, *H. biaka ;* 24, *H. helenita ;* 25, *H. cuprea ;* 26, *H. ardosiacea ;* 27, *H. limbata ;* 28, *H. silicea ;* 29, *H. meforensis ;* 30, *H. riuensis ;* 31, *H. pruina ;* 32, *H. lamia ;* 33, *H. viriditincta :* 34, *H. neurapacuna.*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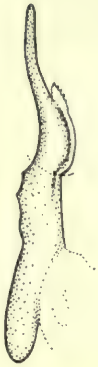
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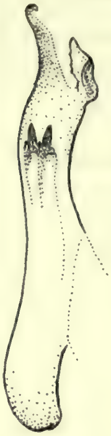
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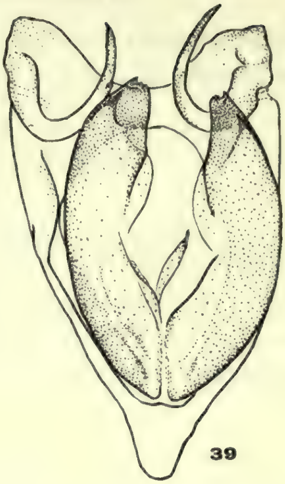
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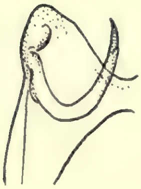
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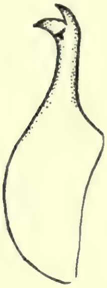
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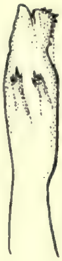
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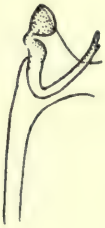
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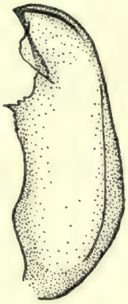
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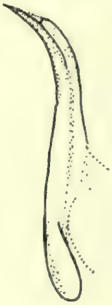
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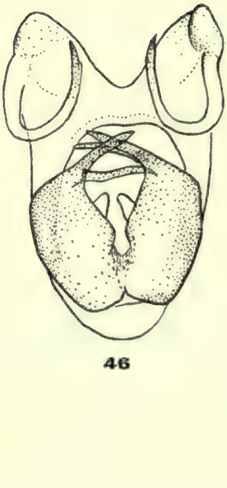
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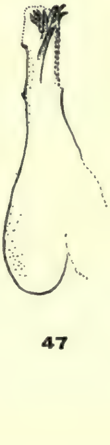
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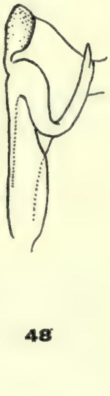
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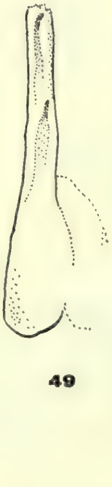
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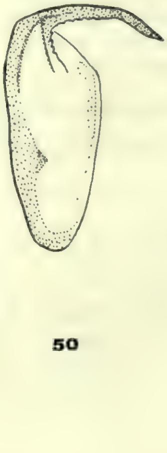
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(ii) ***C. cyprotus pallescens*** **ssp. n.**

Generally larger than the preceding, the male fore wing measuring 16 to 20 mm. as compared with 15–17 mm. of *c. cyprotus*. The male ground colour is of a softer, more rosaceous hue. The female does not differ above from that of the nominate race. Beneath, both sexes have a dusty ochraceous ground, much paler than that of *c. cyprotus* ; the submarginal and discal markings are fine, but the pattern is usually complete, whereas that of *cyprotus* has a marked tendency to obsolescence.

Waterhouse (1928) states that at Brisbane the species produces two broods in the year.

Holotype ♂, AUSTRALIA : Queensland : Brisbane, Taylor Range (*P. P. Dodd*), B.M. Type No. Rh. 16807.

Allotype ♀, AUSTRALIA : Queensland : Emu Park Coast (23° 13′ S., 150° 51′ E.) (*Barnard Coll.*), B.M. Type No. Rh. 16808.

Other material, AUSTRALIA : Queensland ; Brisbane ; Duaringa.

CANDALIDES Hübner

Candalides Hübner, 1819 : 73.

Type : *Rusticus adolescens xanthospilos* Hübner.

The terminal segment of the labial palp is almost two-thirds the length of the middle segment. The wing margins are entire, not scalloped or emarginated. Veins 7 and 9 on the fore wing arise from a short stalk, which extends for less than half the distance between its base and the end of vein 7 ; vein 11 runs almost parallel with 12.

Candalides xanthospilos (Hübner)

(Text-figs. 3, 10, 43, 44 and 45)

Rusticus xanthospilos Hübner, 1817 : pl. 99.
Polyommatus hubnerii Godart, 1824 : 677, Timor ?
Erina pulchella Swainson, 1833 : 134.
Candalides xanthospilos (Hübner) ; Grünberg in Seitz, 1921 : 853, pl. 145f, Australia.

Distribution, AUSTRALIA : Queensland, New South Wales, and South Australia.

Candalides bysos (Boisduval)

Lycaena bysos Boisduval, 1832 : 81, Port Jackson.

This name was given by Waterhouse (1903 : 177) as a synonym of *xanthospilos*, but Boisduval's description mentions a yellow band on the hind wing, and his

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FIGS. 36, 39, 46. ♂ genital armature : 36, *Holochila absimilis ;* 39, *H. grandissima ;* 46, *H. subrosea.*

FIGS. 37, 38, 42, 45, 47, 49. aedeagus : 37, *H. absimilis ;* 38, *H. grandissima ;* 42, *H. consimilis ;* 45, *Candalides xanthospilos ;* 47, *Holochila subrosea ;* 49, *Cyprotides cyprotus.*

FIGS. 41, 44, 50. ♂ clasper : 41, *Holochila consimilis ;* 44, *Candalides xanthospilos ;* 50, *Cyprotides cyprotus.*

FIGS. 40, 43, 48. uncus : 40, *Holochila consimilis ;* 43, *Candalides xanthospilos ;* 48, *Cyprotides cyprotus.*

description of the underside does not quite apply to that species. In view of this uncertainty, and as there are no specimens in the B.M. (N.H.) identifiable with *bysos*, the name is placed here tentatively.

ERINA Swainson

Erina Swainson, 1833 : 134.

Type : *Hesperia erinus* Fabricius.

The terminal segment of the labial palp is well over half the length of the penultimate segment, it is long and spike-like. Veins 7 and 9 arise from a stalk, which extends to half the distance from its point of origin and the end of vein 7. Vein 12 is not distinctly angled like that of *Holochila*, but it does diverge from vein 11 as it nears the costa.

Under the heading " *Erina pulchella* " Swainson designated *Erina* as a subgenus of *Polyommatus* as follows : " Wings obtuse, very entire : palpi covered only with compact scales, the last joint lengthened, slender, and very naked. Club of the antenna short, broad, and spatulate. Colour, dark blue, spotted beneath. Typical. *Hesp. erinus* Fab. Aberrant. *Lycaena ignita* Leach ". He then went on to describe and figure *Erina pulchella* (= *Candalides xanthospilos*). To avoid confusion, and as no type has so far been selected, I hereby designate *Hesperia erinus* Fabricius as the type of the genus.

KEY TO THE SPECIES OF *ERINA*

1 Both sexes on the upper surface are blue . . . ***hyacinthina simplexa*** (p. 216)
– Both sexes on the upper surface are brown, with a purple reflection in the males ; this reflection is sometimes present in the females also 2
2 Large, the male fore wing measuring 14–17 mm.; the female 15–17 mm. ***hyacinthina hyacinthina*** (p. 217) and ***h. eugenia*** (p. 217)
– Small, the male fore wing measuring 10–13 mm.; the female 10–14 mm. . . . 3
3 Underside, dull grey, the three lower submarginal spots on the fore wing are large, diffuse, and blackish brown in colour . . . . ***acasta*** (p. 217)
– Underside, whitish grey, the two lower submarginal spots on the fore wing are intense black and clearly defined . . . . ***erina*** (p. 217)

Erina hyacinthina (Semper) **comb. n.**

(i) ***E. hyacinthina simplexa*** (Tepper) **comb. n.**

(Text-fig. 52)

Cupido simplexa Tepper, 1882 : 30, pl. 2, fig. 10, S. Australia.
Polyommatus cyanites Meyrick, 1888 : 823, W. Australia (Type !).

Waterhouse (1914 : 81) says : " This is the western race of *C. hyacinthina*. It occurs in the northwestern areas of Victoria, in South Australia, and in West Australia ".

The male genitalia are indistinguishable from those of the nominate race, and notwithstanding the marked external difference mentioned in the key, it would seem that Waterhouse's statement is correct.

Distribution, AUSTRALIA : NW. Victoria ; South Australia ; West Australia.

(ii) ***E. hyacinthina eugenia*** (Waterhouse & Lyell) **comb. n.**

Candalides hyacinthina eugenia Waterhouse & Lyell, 1914 : 80, Kuranda.

Distribution, AUSTRALIA : Queensland.

(iii) ***E. hyacinthina hyacinthina*** (Semper) **comb. n.**

(Text-fig. 51)

Holochila hyacinthina Semper, 1879 : 162, Sydney.

Distribution, AUSTRALIA : New South Wales and Victoria.

(iv) ***E. hyacinthina josephina*** (Harris)

Candalides hyacinthina josephina Harris, 1952 : 33, Victoria (Stawell).

Distribution, AUSTRALIA : Victoria : Fern Tree Gully, xii.1956 (*H. Borch*), 2 ♂ ; Tecoma, xii.1956 (*H. Borch*), 1 ♂, 1 ♀ ; Birchip, 1 ♀ ; Emerald (*Jarvis*), 1 ♂.

Erina acasta (Cox) **comb. n.**

(Text-fig. 53)

Lycaena acasta Cox, 1873 : 402, Bremer, R., S. Australia (Type !).
Holochila anita Semper, 1879 : 163, Sydney and Cape York (Type !).
Lycaena moerens Rosenstock, 1885 : 377, S. Australia (Type !).
Lycaena canescens Miskin, 1890 : 35, Tasmania.
Candalides acasta (Cox) Waterhouse, 1932 : 133, pl. 19, figs. 11–11A.

Distribution, AUSTRALIA: Brisbane southwards to New South Wales, Victoria, South Australia, and West Australia.

Erina erina (Fabricius)

(i) ***E. erina erina*** Fabricius

(Text-fig. 4, 11 and 54)

Papilio erinus Fabricius, 1775 : 525, Nova Hollandia.
Polyommatus subpallidus Lucas, 1890 : 117, Queensland.
Candalides erinus (Fabricius) Grünberg in Seitz, 1921 : 852, North and Northwest Australia.
Candalides erinus (Fabricius) ; Waterhouse, 1932 : 133, pl. 19, figs. 10–10A.

In the male, the upperside is brown with a reddish violet reflection, and the fore wings are widely margined with a black band that increases in width towards the apex. A similar but much narrower band is present on the hind wing. Because of a slight sheen on the surface of the wings, these bands are indistinct in certain lights. The female is completely dull brown above, and the fringes in both sexes are whitish. The length of the fore wing in both sexes varies between 10 and 13 mm. The male armature is remarkable in having two lateral shield-like extensions of the vinculum, apparently protecting the lower part of the valves ; these extensions are densely covered with tiny points and nodules near and along their outer edges. The valves have a bulbous base, which is produced apically into a long pointed ribbon-like process, occupying quite four-fifths of the total length of the valve. No subspecific differences can be observed in the genitalia.

Distribution, AUSTRALIA : Queensland and Northwest Australia.

(ii) *E. erina sumbensis* ssp. n.

Slightly smaller than *E. erina*, the fore wing in both sexes measuring from 9 to 11 mm. On all wings in the male, the marginal bands are much wider, quite twice the width of those of the nominate subspecies. The dull brown female does not differ above from that race. On the underside in both sexes, the two lower submarginal spots on the fore wing are slightly smaller.

Holotype ♂, Lesser Sunda Islands : Sumba, ii.1896 (*W. Doherty*), B.M. Type No. Rh. 16809.

Allotype ♀, as holotype, B.M. Type No. Rh. 16810.

Other material, Lesser Sunda Islands : as holotype, 3 ♂, 2 ♀ ; Savu Island, viii. 1896, (*Everett*), 1 ♀.

(iii) *E. erina timorensis* ssp. n.

Larger than the preceding, wing measurements varying from : males 10–12 mm.; females 12–14 mm. The black margins in the male are as wide as or wider than those of *sumbensis*. The female is like the preceding race on the upperside. Beneath, in both sexes, the two lower submarginal spots are decidedly larger than those of any other subspecies.

Holotype ♂, Timor : Oinainisa, xi–xii.1891 (*W. Doherty*), B.M. Type No. Rh. 16811.

Allotype ♀, as holotype, B.M. Type No. Rh. 16812.

Other material, Timor and Neighbouring Islands : as holotype, 7 ♂, 3 ♀ ; Atapupu, viii.1897 (*Everett*), 1 ♂ ; Semao Island (*J. J. Walker*), 1 ♂ ; Kisser Island, 5 ♂, 3 ♀ ; Letti Island, vii.1892 (*W. Doherty*), 1 ♂, 1 ♀ ; Wettar Island, v.1892 (*W. Doherty*), 2 ♀.

(iv) *E. erina tualensis* (Röber) comb. n.

Plebeius tualensis Röber, 1886 : 61, pl. 5, fig. 26, Key Islands.

Fore wing measurements : males 10·5–13 mm.; females 11–14 mm. The dark margins are not so wide as those of the two preceding subspecies ; that of the fore wing is of more even width throughout than is that of the nominate race. The female is not distinguishable above from that of the preceding race. The underside in both sexes is like that of *e. erina*.

Distribution, Key Islands.

(v) *E. erina taamensis* ssp. n.

Fore wing measurements : males 10–12 mm.; females 12–13 mm. The male above is light brown, with a faint golden tint in the red-violet gloss ; the dusky margins are much reduced. In the female the ground is pale reddish mauve, the veins on all wings are darkened with dusky scales, and there is a wide dusky margin on each wing. Beneath, both sexes are like the nominate race.

Holotype ♂, Western Key Islands : Taam, vii.1898 (*H. Kuhn*), B.M. Type No. Rh. 16813.

Allotype ♀, as holotype, B.M. Type No. Rh. 16814.

Other material, Western Key Islands : as holotype, 8 ♂, 1 ♀ ; Koer Islands, vi.1898 (*H. Kuhn*), 3 ♂.

(vi) ***E. erina tenimberensis*** **ssp. n.**

Fore wing measurements : males 11 mm.; females 12–13 mm. The male is above very like that of *taamensis*, but the dark margins though shadowy and obscure are usually wider. The female is pale earth-brown with on the hind wing a clouding of mauve tinted whitish grey between the veins. The under surface has a slightly more ochreous tint than in the preceding race.

Holotype ♂, TENIMBER : vi–vii.1892 (*W. Doherty*), B.M. Type No. Rh. 16815.

Allotype, ♀, as holotype, B.M. Type No. Rh. 16816.

Other material, TENIMBER : as holotype, 4 ♂, 8 ♀ ; South Yamdena, 20 miles S. of Saumlakki, vi–ix.1918 (*W. J. C. Frost*), 1 ♂ ; Larat Island, Ritabel, 1897 (*Doherty*), 1 ♂, 1 ♀ ; Selaru Island, 19.xii.1929 (*Miss Longfield*), 1 ♀.

(vii) ***E. erina stevensi*** (Wind & Clench) **comb. n.**

Candalides erinus stevensi Wind & Clench, 1947 : 1, Wau, Morobe District.

Fore wing measurements : males 10–10·5 mm.; females 11–13 mm. On the upperside, the male is very like *timorensis* ; it has the same wide dark margins, and lacks the pale golden tinge of the Key Island race. The female is completely dull brown above. Beneath the two lower submarginal spots are obsolete or tend to obsolescence ; they are never so large or clearly marked as those of the other subspecies.

Distribution, DUTCH NEW GUINEA : Humboldt Bay, ix–x.1892 (*W. Doherty*), 1 ♂, 2 ♀ ; Cyclops Mountains, Sabron Camp, iv–vii.1936 (*L. E. Cheesman*), 11 ♂, 1 ♀.

(viii) ***E. erina sudesta*** **ssp. n.**

Fore wing measurements : males 10–12 mm.; females 11–12 mm. The male is above not distinguishable from the preceding race, but close examination of the otherwise brown female reveals a thin scattering of blue scales on all wings ; to the naked eye, these scales are only observable as a faint bluish shade in the area below the cell of the fore wing ; under a microscope however, they can be seen to extend—sparsely scattered—over the greater part of the basal halves of the wings. The under surface in both sexes is ochreous grey, much darker than the whitish grey of other races ; all the markings are distinct, and with the exception of the two black submarginal spots, are ochreous brown in colour.

Holotype ♂, LOUISIADE ARCHIPELAGO : Sudest Island (*A. S. Meek*), B.M. Type No. Rh. 16817.

Allotype ♀, as holotype, B.M. Type No. Rh. 16818.

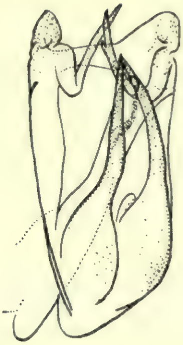
Other material, as holotype, 6 ♂, 6 ♀.

MICROSCENA **gen. n.**

(Gr. μικρός, small, σκηνή, cell, fem.)

Type species : *Lycaena heathi* Cox.

Differs from *Candalides* by the following characters : the terminal segment of the labial palp is only approximately half the length of the middle segment. The fore wing cell is short, being less in length than vein 6, and the stalk of veins 7 and 9 is less than half the distance from its base to the end of vein 7. Vein 12 turns in an even curve towards the costa, it does not run parallel to vein 11.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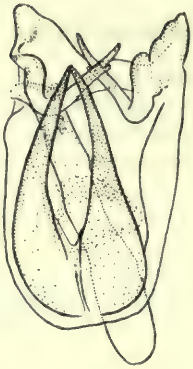
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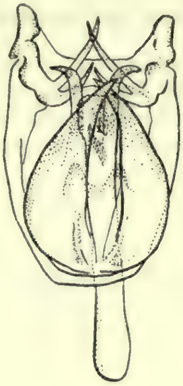
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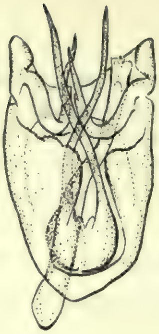
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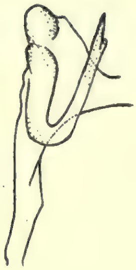
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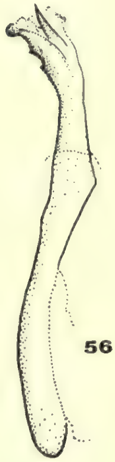
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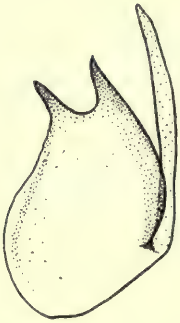
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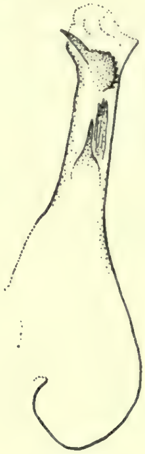
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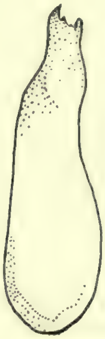
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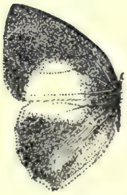
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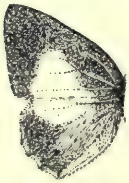
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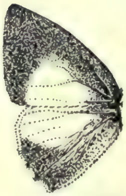
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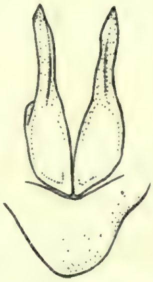
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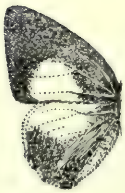
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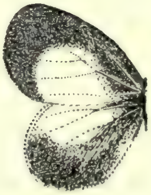
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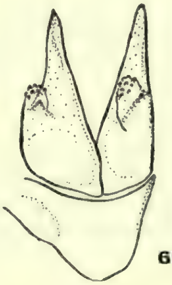
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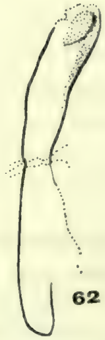
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Microscena heathi (Cox) **comb. n.**
(Text-figs. 5, 12, 55, 56 and 57)

(i) ***M. heathi heathi*** (Cox) **comb. n.**

Lycaena heathi Cox 1873 : 402, South Australia (Type !).
Lycaena paradoxa Guest 1882 : 36, Balhannah Co., Adelaide.
Candalides heathi (Cox) Waterhouse 1932 : 130, pl. 19, fig. 4.

The male is bronze-brown with a purple reflection and dusky margins ; in some examples, the veins have a tendency to form yellowish rays. The female is duller brown, with the basal portions of all wings dusky mauve. On the underside, both sexes are silky grey-white, with an interneural series of submarginal black dots.

Distribution, AUSTRALIA : Western Australia, South Australia, New South Wales and Queensland.

(ii) ***M. heathi alpina*** (Waterhouse) **comb. n.**

Candalides heathi ssp. *alpina* Waterhouse 1928 : 402, Mt. Kosciusko.

This is a high altitude race, with distinctly paler veins, and a bronze-grey underside.

Distribution, AUSTRALIA : Mt. Kosciusko.

(iii) ***M. heathi aerata*** (Montague) **comb. n.**

Holochila heathi aerata Montague 1914 : 645, Monte Bello Islands.

(iv) ***M. heathi doddi*** (Burns) **comb. n.**

Candalides heathi doddi Burns, 1947 : 95, New South Wales (Barrington Tops).

Not represented in B.M. (N.H.).

ADALUMA Tindale

Adaluma Tindale, 1922 : 537.

Type species : *Adaluma urumelia* Tindale.

Distinguished from *Candalides* and other allied genera by the extremely short antennae, which are well under half the length of the costa. The terminal segment of the labial palp is just over half the length of the middle segment. The wings are short, the fore wing costa and distal margin rounded, and the apex obtuse. Veins 7 and 9 of the fore wing arise from a short

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FIGS. 51–54. ♂ genital armature : 51, *Erina hyacinthina hyacinthina ;* 52, *E. hyacinthina simplexa ;* 53, *E. acasta ;* 54, *E. erina.*

FIG. 55. uncus : *Microscena heathi.*

FIGS. 56, 58, 62. aedeagus : 56, *Microscena heathi ;* 58, *Adaluma urumelia ;* 62, *Philiris harterti.*

FIGS. 57, 59, 60, 61. claspers : 57, *Microscena heathi ;* 59, *Adaluma urumelia ;* 60, *Philiris albiplaga ;* 61, *P. harterti.*

FIGS. 63–67. wings : 63, *Philiris albiplaga* ♂ ; 64, *P. harterti melanoma* ♂ ; 65, *P. harterti leucoma* ♂ ; 66, *P. harterti harterti* ♂ ; 67, *P. harterti harterti* ♀.

stalk, which only extends to one-third of the distance from its point of origin and the end of vein 7. Vein 12 is strongly turned towards the costa, where it nears the origin of vein 11. This last named character obtains throughout the series in the B.M. (N.H.), although Tindale states that these veins run parallel.

Adaluma urumelia Tindale
(Text-figs. 6, 13, 58 and 59)

Adaluma urumelia Tindale, 1922 : 537, pl. 31, Northern Territory.
Candalides wilkinsi Riley, 1928 : 187, Groote Eylandt (Type !).
Candalides wilkinsi Riley ; Riley, 1930 : 211.

The male is silky white with a blue tinge, the centre of the fore wing is rayed with specialized dark scales along the veins ; the margins are grey-black. Beneath, both sexes are whitish with 6 interneural submarginal black spots on the hind wing, and similar spots in areas 2 and 3 of the fore wing.

Distribution, AUSTRALIA : Northern Territory : Groote Eylandt, iii.1925 (*G. H. Wilkins*), 7 ♂, 2 ♀ (including holotype and allotype of *wilkinsi*).

PHILIRIS Röber

Philiris Röber, 1891 : 317.

Type species : *Thecla ilias* Felder.

The distal margin of the hind wing is emarginate. The terminal segment of the labial palp is slightly less than half the length of the central segment. On the fore wing, the stalk of veins 7 and 9 is very long, extending well over half the distance between its point of origin and the end of vein 7 ; vein 12 approaches vein 11 more closely than is the case in *Candalides* or *Holochila*.

KEY TO THE SPECIES OF *PHILIRIS*

MALES ONLY

1	Underside, yellow or orange-red	2
–	Underside, some shade of buff, grey, or white	5
2	Underside, with metallic submarginal spots	3
–	Underside, without metallic submarginal spots	4
3	Upperside, basal two-thirds of fore wing brilliant green-blue. Underside, yellow ; series of metallic spots complete	***sublutea*** (p. 225)
–	Upperside, shining blue. Underside, orange-red ; series of metallic spots incomplete	***caerulea*** (p. 226)
4	Upperside, fore wing dark brown, hind wing cream with a dusky basal area. Underside, creamy yellow	***hemileuca*** (p. 226)
–	Upperside, all wings brown. Underside, clear yellow	***hypoxantha*** (p. 226)
5	Underside, some shade of buff or grey	6
–	Underside, white or near-white	12
6	Upperside, purple or violet	7
–	Upperside, bright shining blue	11
7	Antennae, clubs tipped with yellow-brown	8
–	Antennae, clubs entirely black	10
8	Fore wing, apex acute	***apicalis*** (p. 227)
–	Fore wing, apex obtuse	9
9	Upperside, dark margins wide or very wide	***griseldis*** (p. 227)
–	Upperside, dark margins narrow	***philotas*** (p. 229)

10 Upperside, dusky brown-purple, margins narrow ***philotoides*** (p. 229)
– Upperside, violet, margins wide ***ianthina*** (p. 229)

11 Upperside, light shining blue. Underside, cream-buff ***agatha*** (p. 230)
– Upperside, intense lustrous blue. Underside, brown-buff ***montigena*** (p. 230)

12 Underside, never with a small black dot near the hind margin of the hind wing 13
– Underside, always with a small black dot near the hind margin of the hind wing 21

13 Upperside, black and white 14
– Upperside, blue or purple 15

14 Frons, tufted with rust-red hair. Upperside, white areas extensive ***harterti*** (p. 230)
– Frons, tufted with dusky brown hair. Upperside, white areas restricted ***albiplaga*** (p. 231)

15 Upperside, blue 16
– Upperside, purple 18

16 Upperside fore wing, dark margin at apex is twice its width at tornus ***praeclara*** (p. 232)
– Upperside fore wing, dark margin at apex is three times its width at tornus 17

17 Upperside, shining blue with a refractive red-purple lustre ***gloriosa*** (p. 232)
– Upperside, glittering blue without noticeable refractive qualities ***elegans*** (p. 234)

18 Upperside fore wing, apex black to a depth of 5 mm. ***lavendula*** (p. 234)
– Upperside fore wing, apex not widely black 19

19 Upperside fore wing, white cloud in disc ***diana diana*** (p. 235)
– Upperside fore wing, no white cloud in disc 20

20 Fore wing, apex acute ***diana papuanus*** (p. 235)
– Fore wing, apex obtuse ***ariadne*** (p. 235)

21 Upperside, predominantly black and white 22
– Upperside, blue or purple, if white is present it never predominates 23

22 Underside all wings, with large quadrate discoidal spots ***unipunctata*** (p. 235)
– Underside all wings, without discoidal spots ***refusa*** (p. 236)

23 Upperside, all wings blue or blue with whitish disc on fore wing 24
– Upperside, all wings or at least fore wings purple 31

24 Upperside, shining metallic blue 25
– Upperside, blue, but never metallic blue 26

25 Upperside hind wing, inner edge of junction of marginal and costal black bands forms an even arc ***intensa*** (p. 237)
– Underside hind wing, inner edge of junction of marginal and costal black bands shows an irregularity ***regina*** (p. 237)

26 Antennae, clubs black 27
– Antennae, clubs tipped with yellow 29

27 Fore wings, long and pointed. Upperside, feebly shining light blue, margins of hind wings narrow ***zadne*** (p. 239)
– Fore wings short and broad. Upperside, dark margins very wide, restricted blue areas slightly tinged with green 28

28 Upperside fore wing, blue area extends into the lower half of the cell ***kumusiensis*** (p. 239)
– Upperside fore wing, blue area extends into almost all of the cell ***argenteus*** (p. 239)

29 Upperside, light blue with a white discal patch on the fore wing ***kamerungae*** (p. 240)
– Upperside, light blue without a white discal patch on the fore wing 30

30 Upperside, light blue ***nitens*** (p. 240)
– Upperside, blue with a refractive purple lustre ***azula*** (p. 241)

31 Underside, a clearly defined black discoidal spot on each wing ***angabunga*** (p. 241)
– Underside, without a black discoidal spot on each wing 32

32 Upperside, fore wing purple, hind wing blue ***fulgens*** (p. 242)
– Upperside, fore and hind wings purple 33

33 Genitalia, lobes of uncus have a narrow cleft in them, in some cases the lobes are produced 34
– Genitalia, uncus between the lobes is straight or widely concave, lobes not produced 47
34 Upperside hind wings, margins wide, at least 2 mm. in width 35
– Upperside hind wings, margins narrow, less than 2 mm. in width 36
35 Fore wings, acute, dark margins clearly defined ***remissa*** (p. 242)
– Fore wings, obtuse, dark margins ill defined inwardly ***moluccana*** (p. 242)
36 Upperside hind wing, costa broadly white 37
– Upperside hind wing, costa fuscous 38
37 Upperside fore wing, veins in disc of wing bearing scattered white scales ***mayri*** (p. 243)
– Upperside fore wing, veins in disc of wing not bearing scattered white scales ***ziska*** (p. 243)
38 Underside, pearly grey-white with a white discocellular streak on each wing ***misimensis*** (p. 244)
– Underside, white or near white without a discocellular streak on each wing 39
39 Antennae, clubs completely black ***tombara*** (p. 244)
– Antennae, clubs tipped with fulvous 40
40 Upperside hind wing, black margin not noticeably widened in cellule 6 41
– Upperside hind wing, black margin noticeably widened in cellule 6 44
41 Fore wing, apex rounded, only narrowly black on upperside ***phengotes*** (p. 244)
– Fore wing, apex not rounded, widely black on upperside 42
42 Fore wing, length 13 mm. ***dinawa*** (p. 245)
– Fore wing, length 15–16 mm. 43
43 Upperside, dull purple ***melanacra*** (p. 245)
– Upperside, purple with strong blue refraction ***lucescens*** (p. 247)
44 Fore wings, acuminate Upperside, pale mauve-purple ***innotatus*** (p. 247)
– Fore wings, not acuminate. Upperside, blue-purple 45
45 Upperside, blue-purple with strong reddish refraction ***riuensis*** (p. 248)
– Upperside, purple without reddish refraction 46
46 Upperside hind wing, distal margin less than 1 mm. in width ***moira*** (p. 248)
– Upperside hind wing, distal margin 1–2 mm. in width ***ignobilis*** (p. 249)
47 Upperside hind wing, costa broadly white 48
– Upperside hind wing, costa not white 50
48 Upperside hind wing, costal white extends to vein 6 ***albicostalis*** (p. 249)
– Upperside hind wing, costal white does not extend beyond vein 7 49
49 Upperside, reddish purple, fore wing costa and apex broadly black ***marginata*** (p. 249)
– Upperside, bluish purple, fore wing costa and apex narrowly black ***doreia*** (p. 249)
50 Thorax, stout (3–4 mm.). Fore wing, strong, its apex subacuminate 51
– Thorax, slender (less than 3 mm.). Fore wing weak, its apex obtuse 52
51 Upperside fore wing, apical black extensive, reaching discocellular in area 5 ***goliathensis*** (p. 250)
– Upperside fore wing, apical black narrow, not approaching discocellular ***vicina*** (p. 250)
52 Cilia hind wings, not spotted at the ends of veins 5, 6 and 7 ***albihumerata*** (p. 252)
– Cilia hind wing, spotted at the ends of all veins 53
53 Upperside, black margins wide, and of approximately even width throughout ***satis*** (p. 252)
– Upperside, black margins not so wide, and not of even width, being always broadened at the apex of the fore wing 54
54 Upperside, black margins less than 1 mm. in width 55
– Upperside, black margins are more than 1 mm. in width 56
55 From the Moluccas ***ilias*** (p. 252)
– From New Guinea ***subovata*** (p. 253)

56 Upperside, black margins on hind wing are over 2 mm. in width . . **oreas** (p. 253)
– Upperside, black margins on hind wing are less than 2 mm. in width **kapaura** (p. 253)

The two following names are not included in the above key, or in the pages that follow ; both were described from females, and no males have so far been identified. Therefore it has not been possible to assign them to a definite position in the genus.

Philiris cyana (Bethune-Baker) **comb. n.**

Candalides cyana Bethune-Baker, 1908 : 122, pl. 8, Owgarra (Type !).

Only represented by the holotype in the B.M. (N.H.).

Philiris? violetta (Röber)

Candalides violetta Röber, 1926 : 376, S.W. New Guinea.

Not identified, the description makes the inclusion of the species in *Philiris* appear probable.

Philiris sublutea (Bethune-Baker)

(i) ***P. sublutea sublutea*** (Bethune-Baker) **comb. n.**

(Pl. 3, fig. 143. Text-fig. 68)

Candalides sublutea Bethune-Baker, 1906 : 101, Owgarra (Type !).
Candalides sublutea Bethune-Baker ; Bethune-Baker, 1908 : pl. 8, fig. 9.

In the male, the brilliant refractive blue-green colour in the basal portions of the fore wing extends subcostally to two-thirds the length of the costa ; from the cell it does not proceed beyond the discocellulars ; below this, it just enters the bases of cellules 2 and 3, and then extends distally to include the basal two-thirds of cellule 1, receding from there to a point at less than half the length of the hind margin. The costa and the remaining distal part of the wing are black. The brown-black hind wings bear a scattering of blue-green scales below the cell, and in most examples, a submarginal series of spots of the same colour. On the underside, the uniform chrome-yellow colour, and the series of metallic submarginal spots on all wings, make this a readily identifiable species.

The hitherto undescribed female differs from the male as follows : the paler blue-green colour extends beyond the discocellulars of the fore wing, its boundary forming an even curve from above the cell to its distal limit in cellule 1 ; the costa is more widely black, and bears a scattering of blue-green scales in the subcostal region, just above the end of the cell ; on the hind wing, blue-green scales cover the area between vein 1 to beyond vein 3, and extend into the lower part of the cell ; the submarginal parts of this area are somewhat clouded by a dusting of blackish scales, and enlivened in most individuals by clear blue-green submarginal spots. The underside is paler yellow, but is otherwise similar to that of the male.

Neallotype ♀, BRITISH NEW GUINEA : Angabunga River, 6000′, xi–ii.1904–5 (*A. S. Meek*), B.M. Type No. Rh. 16871.

Other material, BRITISH NEW GUINEA : as neallotype, 5♂, 3♀ ; Owgarra (*A. S. Meek*), 5 ♂ (including holotype), 1 ♀. MANDATED NEW GUINEA : West side of Herzog Mountains, Eidie Creek, 6100′, 1928 (*A. F. Eichhorn*), 1 ♂. DUTCH NEW GUINEA : Weyland Mountains, Menoo Valley, Mount Kunupi, 6000′, xi–xii.1920 (*Pratt Bros.*), 1 ♀.

(ii) ***P. sublutea extensa* ssp. n.**

(Pl. 3, fig. 142. Text-fig. 69)

The blue-green colour on the fore wing in the male extends farther subcostally than in the nominate subspecies, extending to within only two millimetres of the apex ; in some individuals, this colour also extends beyond the discocellulars. On the hind wing, the blue-green colour is more extensive, covering the lower half of the cell, and the area from vein 1 to vein 4 or beyond ; the blue-green submarginal series of spots is absent. The under surface is exactly as in *sublutea*. In the female, the blue-green areas are more extensive, especially those of the hind wing.

Holotype ♂, DUTCH NEW GUINEA : Arfak Mountains, Angi Lakes, 6000′, ii.1914 (*Pratt Bros.*), B.M. Type No. Rh. 16819.

Allotype ♀, as holotype, i–ii.1914, B.M. Type No. Rh. 16820.

Other material, DUTCH NEW GUINEA : as holotype, 4 ♂, 1 ♀ ; Arfak, Dohunsehik, 1400 m., vi.1928 (*E. Mayr*), 1 ♂.

***Philiris caerulea* sp. n.**

(Text-fig. 70)

Larger than the preceding species, the male fore wing measures 14 mm. The wings are shining blue above, with wide black distal and costal margins, which encroach narrowly along the veins well into the blue area. In areas 4 and 5 of the fore wing, the distal marginal band projects inwards towards the discocellulars. The anal fold of the hind wing is dusky brown. On the underside, the colour is fiery orange-red, with a drab patch below vein 1 of the fore wing ; the metallic submarginal spots are represented on that wing by a rounded spot in the apex, and a tiny point below it in cellule 5 ; the hind wings of the only specimen have suffered considerable damage, and the left-hand wing is partly crippled ; two metallic spots are however observable on the right hind wing—one each in areas 1 and 2.

Holotype ♂, MANDATED NEW GUINEA : Rawlinson Mountains (*Keysser*), B.M. Type No. Rh. 16821.

***Philiris hemileuca* (Jordan) comb. n.**

Candalides hemileuca Jordan, 1930 : 282, Herzog Mountains (Type !).
Candalides hemileuca Jordan ; Jordan, 1930a : 60, pl. 3, fig. 13.

Distribution, MANDATED NEW GUINEA : Herzog Mountains, 6100′, 1928 (*A. F. Eichhorn*), 2 ♂, (including holotype).

***Philiris hypoxantha* (Röber) comb. n.**

(Text-fig. 72)

Candalides hypoxantha Röber, 1926 : 375, S.W. New Guinea.

The female is rather lighter brown than the male ; its fore wing distal margin is more convex, and the costal region of the hind wing in the example from Mount Goliath is pale ochreous brown. The Oetakwa River female exhibits an obscure whitish smear in the centre of the fore wing, and a dull cream-white area on the hind wing, covering the costa, the apex, and extending downwards as far as vein 5 in the outer two-thirds of the wing ; this cream-white area is sullied submarginally by a scattering of brown scales. On the underside, both females are identical with the male. The significance of these two female forms cannot be assessed until more material is available.

Distribution, DUTCH NEW GUINEA : Snow Mountains, near Oetakwa River, up to 3500′, 1910 (*A. S. Meek*), 1 ♂, 1 ♀ ; Mount Goliath, 5000′, iii.1911 (*A. S. Meek*), 1 ♂, 1 ♀ ; Sabang, 14.vii.1907, 1 ♂.

***Philiris apicalis* sp. n.**

(Pl. 3, fig. 144. Text-fig. 71)

Fore wing length 17 mm., the apex is acute, and the distal margin almost straight ; the anal angle of the hind wing is somewhat produced. All wings are deep purple-blue ; the fore wing with the costal, apical and distal regions widely black. On the hind wing, the costa is pale earth-brown, the wide distal margin is black, and the anal fold fuscous, being further obscured by the presence of long red-brown hairs. The underside is satiny brown-grey, and entirely without markings. The fringes in the only example are missing.

Holotype ♂, NEW BRITAIN : Talesea, iii–iv.1925 (*A. F. Eichhorn*), B.M. Type No. Rh. 16822.

Philiris griseldis (Staudinger) **comb. n.**

(i) ***P. griseldis gisella*** (Staudinger) **comb. n.**

(Text-fig. 73)

Lycaena griseldis gisella Staudinger, 1888 : 272, Northern Moluccas.
Philiris mneia Druce, 1897 : 15, Batchian (Type !).
Holochila grandis Grose-Smith, 1899 : 14, pl. 7, figs. 12–14, Batchian.
Candalides grandissima Bethune-Baker ; Grünberg (in Seitz), 1921 : fig. 145g.

The heavily black checkered fringes of the hind wing beneath, together with the characters mentioned in the key, ensure ready identification of this insect. Its relationship with *griseldis* is not at first sight obvious ; however, the fact that the two forms are geographically isolated, the identical male genitalia, and the apparently parallel relationship existing between *P. butleri* and *P. intensa*, all point to a subspecific alliance. The female is deep brown-black above, some examples exhibiting a scattering of blue scales in the disc of the fore wing ; two females in the B.M. have a large and definite blue patch in this area.

Distribution, MOLUCCAS : Batchian ; Halmaheira ; Ternate ; Bouru ; Amboina.

(ii) ***P. griseldis aurelia*** (Grose-Smith) **stat. n.**

Holochila aurelia Grose-Smith, 1899 : 13, pl. 18, figs. 1–3, Aru (Type !).

Very similar in both sexes to the nominate race. The dark marginal band on all wings in the male is always wider ; it attains a width of approximately 2 mm. on the distal margin, and widens still more as it approaches the apex of the fore wing. The female is dull brown, with the central and basal portions of the fore wing, and the base of the hind wing, shining blue.

Distribution, ARU.

(iii) ***P. griseldis griseldis*** (Staudinger) **comb. n.**

Lycaena griseldis Staudinger, 1888 : 272, T. 94, Waigeu.
Candalides parvifascia Rothschild, 1915a : 393, Vulcan Island, (Type !), **syn. n.**
Candalides philotas cineraceus Joicey & Talbot, 1917 : 220, Waigeu (Type !), **syn. n.**
Candalides amblypodina Röber, 1926 : 375, S.E. and S.W. New Guinea, **syn. n.**

The distal margins of the male upperside vary in width, but are never so wide as those of the preceding. In the female the blue area of the fore wing is individually variable in extent, and in some cases exceeds that of any specimen of *aurelia* examined.

Male Genitalia : the uncus is only slightly concave between the lobes, the clasps are roughly triangular, broad at the base, and rounded at the apex.

Distribution, NEW GUINEA : Northern Dutch New Guinea ; the islands in Geelvink Bay ; Mandated New Guinea to British New Guinea north of the Owen Stanley Range ; Rook I. ; Dampier I. ; Vulcan I. BISMARCKS : Specimens from New Britain, New Hanover, and New Ireland, are doubtfully placed here until more material for study is available.

(iv) ***P. griseldis dubitata*** (Grose-Smith) **comb. n.**

Holochila dubitata Grose-Smith, 1899 : 13, pl. 18, figs. 4–6, Milne Bay (Type !).

The male upperside is of a lighter and brighter shade of purple than any of the preceding races ; the clear-cut dark margins are conspicuously widened in the apical areas of all wings. In the female, the blue area of the fore wing is paler and more extensive.

Distribution, BRITISH NEW GUINEA : South of Owen Stanley Range eastwards to Milne Bay.

(v) ***P. griseldis aurelioides*** (Rothschild) **stat. n.**

Philiris aurelioides Rothschild, 1915 : 30, Snow Mountains (Type !).

On the average slightly larger than the nominate race ; the male with wider dark margins above (still not so wide as in *aurelia*), and beneath in both sexes the colour is distinctly darker. The differences in wing shape and male colour mentioned by Rothschild are not obvious. The specimens listed by that author as *P. aurelia* and *P. dubitata* are also referable to this race.

Distribution, DUTCH NEW GUINEA : Snow Mountains.

(vi) ***P. griseldis speirion*** Druce **stat. n.**

Philiris speirion Druce, 1897 : 15, Fergusson Island (Type !).

On the upperside, the male is brighter and lighter blue than that of *dubitata* ; in certain lights it has a frosted appearance. All the dark margins are very wide. The blue colour in the female is widely spread over the fore wing, and covers at least the cell and basal half of the hind wing.

Distribution, BRITISH NEW GUINEA and LOUISIADES : Sariba Island ; Goodenough Island ; Fergusson Island.

Philiris philotas (Felder)

(i) ***P. philotas obiana* ssp. n.**

Male. Rather brighter purple than in the nominate race, the dusky margins always wider, and though not so wide as those of *griseldis gisella*, they do suggest a relationship with *p. philotas* similar to that between *gisella* and *griseldis*. The fore wing fringes are dingy brown, those of the hind wings white with black checkers at the vein-ends.

Female. Dingy brown-black, with a shining light blue area on the fore wing covering the lower part of the cell, and the basal portions of areas 1, 2, and 3 ; there is a scattering of blue scales in the basal parts of the hind wing. The fringes are similar to those of the male.

Holotype ♂, MOLUCCAS : Obi, Laiwui, ix.1897 (*W. Doherty*), B.M. Type No. Rh. 16823.

Allotype ♀, as holotype B.M. Type No. Rh. 16824.

Other Material, MOLUCCAS : Obi, vii–ix (*W. J. C. Frost*), 4 ♂, 3 ♀ ; Obi, (*Fruhstorfer*), 1 ♂.

(ii) ***P. philotas philotas*** (Felder)

(Pl. 4, fig. 164. Text-fig. 74)

Thecla philotas Felder, 1860 : 454, Amboina (Type !).
Philiris theleos Druce, 1897 : 15, Amboina (Type !), **syn. n.**

Shining brown-purple in the male, margined with a brown-black border of over 1 mm. in width on the hind wing, and widening on the fore wing to approximately 3 mm. at the apex. The fringes are fuscous on the fore wing with some lightening in colour outwardly ; on the hind wing they are whitish, with a marked dusky checkering at the vein-ends. The female is like that of the preceding race. The male genitalia differ from those of *griseldis* by the shorter and more rounded clasp.

Distribution, MOLUCCAS : Amboina ; Ceram ; Goram Laut ; Watubela ; Buru.

***Philiris philotoides* sp. n.**

(Pl. 3, fig. 146. Text-fig. 75)

The male is very similar in appearance to *philotas*, but the distal margin of the fore wing is more convex and has a slight angle at the end of vein 3. The ground colour is of a duller purple, somewhat smoky in appearance and the veins are slightly darkened. The dusky margins and fringes are as in *philotas*. Beneath the colour is deep buff with a dull sheen, and the fore wing bears a triangular patch of darker scales below the median vein near the base. The male genitalia show no marked differences from the preceding species.

Holotype ♂, BRITISH NEW GUINEA : Aroa River, 4–5600′, v.1905 (*A. S. Meek*), B.M. Type No. Rh. 16825.

Other Material, NEW GUINEA : Aroa River (*Meek*), 3 ♂ ; Angabunga River, xi–ii.1904–5 (*Meek*), 1 ♂ ; Mambare River, Biagi, 5000′, ii.1906 (*A. S. Meek*), 1 ♂ ; Kratke Mountains, Buntibasa District, 4–5000′, vii.1932 (*F. Shaw Mayer*), 1 ♂.

***Philiris ianthina* sp. n.**

(Pl. 3, fig. 145. Text-fig. 76)

Closely allied to *agatha*, but differs as follows : the colour above is bright mauve-violet, enlivened on the hind wing by a broad indeterminate streak of shining blue running from the base, above the cell, and attaining the submarginal area between veins 6 and 7 ; isolated blue scales are present on the discal portions of the veins on all wings ; the dark margins on the fore wings are narrower ; those of the hind wings are only half as wide.

The cilia of all wings, the colour of the underside, and the structure of the male genitalia, are all the same as in *agatha*.

Holotype ♂, DUTCH NEW GUINEA : Arfak Mountains, Mt. Siwi, 800 m., 13.v.1928 (*E. Mayr*), B.M. Type No. Rh. 16826.

Philiris agatha (Grose-Smith) **comb. n.**
(Text-fig. 77)

Holochila agatha Grose-Smith, 1899 : 14, pl. 18, figs. 7–8, Milne Bay.
Candalides aroa Bethune-Baker, 1908 : 122, pl. 8, fig. 7, Aroa River (Type !), **syn. n.**
Candalides gloriosa Bethune-Baker (♀ allotype ! nec. ♂ holotype !), 1908 : 121, Angabunga River.
Candalides agatha (Grose-Smith) Grünberg (in Seitz), 1921, pl. 145h.

Bethune-Baker mistakenly described male *aroa* as a female, and the true *agatha* female as the female of his *Candalides gloriosa.* Examination of the types leaves no doubt that the above synonymy is correct.

Distribution, BRITISH NEW GUINEA : Aroa River (*Meek*), 4 ♂ (including type of *aroa*) ; Hydrographer Mountains, 1918 (*Eichhorn Bros.*), 3 ♀ ; Angabunga River, 6000′, 1904–5 (*A. S. Meek*), 1 ♀.

Philiris montigena **sp. n.**
(Pl. 3, fig. 151. Text-fig. 78)

The male has a marked superficial resemblance to that sex of *P. agatha* ; the blue colour above is slightly more intense, and definitely more lustrous than in that species. All the margins are deeper black-brown, and whereas the distal margin of the fore wing in *agatha* is of equal width, that of *montigena* widens from 2 mm. at the tornus to 6 mm. at its junction with the costal band at the apex. On the hind wing, the costal region above vein 6 is broadly black-brown, and the distal margin measures at least 2 mm. The cilia of all wings are brown basally, but outwardly lightened interneurally with fulvous white. On the underside, the colour is buff with a nacreous lustre, with at the base of area 1 on the fore wing a nebulous brownish patch. The fore wing measures 15 mm.

Holotype ♂, NEW GUINEA : Mt. Goliath, 5–7000′, ii.1911 (*A. S. Meek*), B.M. Type No. Rh. 16827.

Other Material, NEW GUINEA : as holotype, 3 ♂ ; Mambare River, Biagi, 5000′, ii.1906 (*A. S. Meek*), 1 ♂.

Philiris harterti (Grose-Smith) **comb. n.**
(i) ***P. harterti harterti*** (Grose-Smith) **comb. n.**
(Text-fig. 61, 66 and 67)

Holochila harterti Grose-Smith, 1894 : 579, Humboldt Bay (Type !).
Holochila harterti Grose-Smith ; Grose-Smith & Kirby, 1897, pl. 10 (Or. Lyc.) figs. 4 and 5.
Candalides harterti (Grose-Smith) Grünberg (in Seitz), 1921 : 856, pl. 145h.

In the hitherto undescribed female, the apex of the fore wing is blunt, the costa and distal margins of all wings are strongly convex, and the tornus of the hind wing is rounded. The coloration and pattern are like those of the male, but the white patch on each wing is larger and rounder. In the distal area of the hind wing, the dusky portion extends towards the apex, terminating just beyond vein 6.

Neallotype ♀, DUTCH NEW GUINEA : Mt. Goliath, 4°.40″ S., 139°.50″ E., 5000′, iii.1911 (*A. S. Meek*), B.M. Type No. Rh. 16828.

Other material, DUTCH NEW GUINEA : Humboldt Bay, 1892 (*W. Doherty*), 1 ♂ ; (holotype) ; Coast between Geelvink Bay and Humboldt Bay, 1896 (*W. Doherty*), 1 ♂ ; Cyclops Mountains, Sabron, Camp 2, 2000′, v.1936 (*L. E. Cheesman*), 1 ♂ ; Snow Mountains, Near Utakwa River, up to 3500′, x–xii.1910 (*A. S. Meek*), 2 ♂.

(ii) ***P. harterti leucoma* ssp. n.**

(Text-fig. 65)

Male. As in the nominate subspecies, but the white portion of the hind wing is more extensive, covering the greater part of the cell, the central part of the wing above vein 3, reaching the distal margin at vein 5, and embracing the whole of the apical and costal areas. The female also exhibits an extension of the white areas, but in that sex, the dusky portion of the hind wing reaches almost to vein 6.

Holotype ♂, BRITISH NEW GUINEA : Upper Aroa River, iii.1903 (*A. S. Meek*), B.M. Type No. Rh. 16829.

Allotype ♀, as holotype, B.M. Type No. Rh. 16830.

Other material, BRITISH NEW GUINEA : Aroa River (*A. S. Meek*), 13 ♂, ; Milne Bay (*A. S. Meek*), 2 ♂, 1 ♀ ; Hydrographer Mountains, 2500′, 1918 (*Eichhorn Bros.*), 7 ♂, 2 ♀ ; Kumusi River, viii.1907 (*A. S. Meek*), 1 ♂, 1 ♀.

(iii) ***P. harterti melanoma* ssp. n.**

(Text-fig. 64)

In contrast to the preceding, this shows a reduction of the white areas on the hind wings ; in both sexes, the dusky area extends over the inner half of the cell, along the basal third of vein 4, bending upward and reaching the distal margin at vein 7. In all other characters the race conforms with the nominate subspecies.

Holotype ♂, DUTCH NEW GUINEA : Island of Jobi, 1892 (*W. Doherty*), B.M. Type No. Rh. 16831.

Allotype ♀, DUTCH NEW GUINEA : Island of Jobi, 1897 (*W. Doherty*), B.M. Type No. Rh. 16832.

Other material, DUTCH NEW GUINEA : Jobi (*W. Doherty*), 2 ♂, 6 ♀ ; Wandesi, (*W. Doherty*), 2 ♂.

***Philiris albiplaga* (Joicey & Talbot) comb. n.**

(Text-figs. 60 and 63)

Candalides albiplaga Joicey & Talbot, 1916 : 75, pl. 3, fig. 6, Schouten Islands (Type !).

This species has close affinities with *P. harterti*, but in view of the distinctive characters—both superficial and genitalic—indicated below, it is deemed advisable to treat the insect as a separate species. The frons in both sexes is coated with dusky brown hair, in distinct contrast with the rust-red pubescence to be found in *harterti*.

In the hitherto undescribed male, the fore wing is more square, and has a blunt apex ; the hind wing distal margin is well rounded. The white areas on all wings are even more restricted than in *P. harterti melanoma* ; that on the hind wing scarcely penetrating the cell, or anywhere below vein 5, or reaching basewards beyond the juncture of veins 6 and 7. The female has a less convex distal margin and a less rounded apex than does that sex of *harterti* ; in other respects it is very similar to the male.

The male genitalia are similar to those of *harterti*, but differ in the shape of the claspers ; which are very broad at the base, decreasing progressively and evenly in width to their pointed apices ; on their inner surface, each has a bulbous lobe bearing a large number of obtusely pointed protuberances. No such lobe is present on the clasper of *harterti*.

Neallotype ♂, Dutch New Guinea : Mefor Island, viii.1920 (*C., F. & J. Pratt*), B.M. Type No. Rh. 16833.

Other material, Dutch New Guinea : Schouten Islands, Biak, vi.1914 (*A., C. & F. Pratt*), 1 ♀ (holotype) ; as neallotype, 1 ♂, 2 ♀ ; Mefor, Suer, v–vi. 1897 (*W. Doherty*), 1 ♀.

Philiris praeclara sp. n.

(Pl. 3, fig. 150. Text-fig. 79)

The fore wing measures : in the male 17 mm.; in the female 18 mm. The upperside is above smalt blue with, in certain lights, an underlying hint of purple ; it is not however a strongly opalescent colour. A black margin 1·5 mm. wide runs from the base along the costa to join the wider distal band in the apex of the wing. The latter increases in width progressively from 1 mm. at the tornus to 3 mm. at the apex. On the hind wing the costal area above vein 7, and the anal fold, are both dingy fuscous, the distal marginal band is 1 mm. in width from the tornus to vein 6, where it joins the blackish smear which occupies the upper two-thirds of area 6, and merges with the fuscous costal area. The above details refer to the holotype only ; in the male from Mambare River, all the dark marginal bands are distinctly wider. All the nervures, especially those of the hind wing are darkened with blackish scales.

The female is similar to the male, but the blue colour is distinctly paler, the fore wing distal margin is of even width throughout, and the costal margin is doubled in width from the base to just beyond the cell-end. The cilia in both sexes are white, darkened with fuscous at the vein-ends and at the base. The underside is creamy white, and is without a hind marginal black spot on the hind wing. In general appearance both sexes are similar to the female of *P. fulgens*.

Holotype ♂, British New Guinea : Hydrographer Mountains, 2500′, iv.1918 (*Eichhorn Bros.*), B.M. Type No. Rh. 16834.

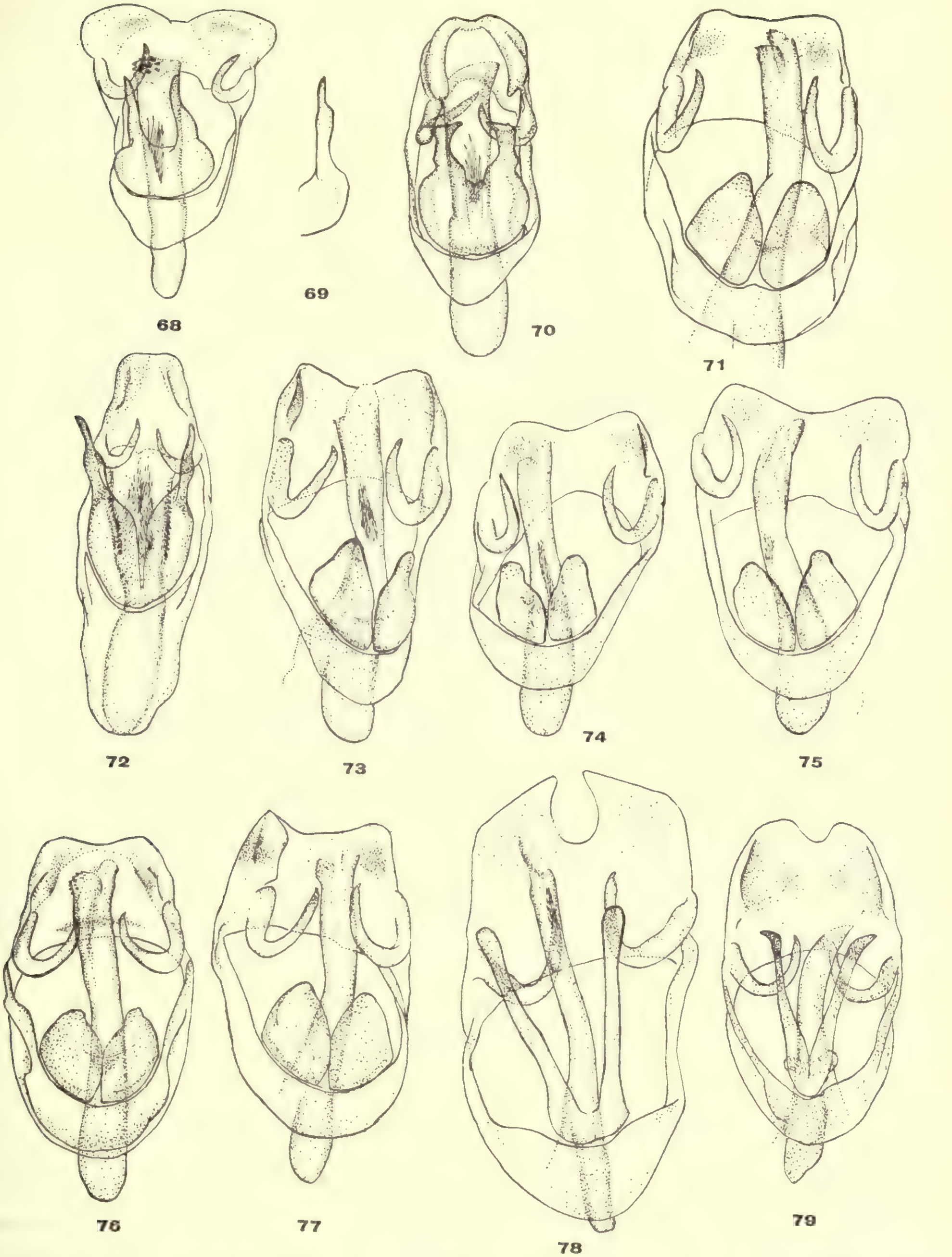
Allotype ♀, as holotype, B.M. Type No. Rh. 16835.

Other material, New Guinea : 2 days north of Fak Fak, 1700′, xii.1907 (*A.E. Pratt*), 1 ♀ ; Lower Mambare River, v.1906 (*A. S. Meek*), 1 ♂.

Philiris gloriosa (Bethune-Baker) comb. n.

(Text-fig. 80)

Candalides gloriosa Bethune-Baker, 1908 : 121 pl. 8, fig. 3, Angabunga River (Type !) (♂ holotype nec ♀ allotype).



FIGS. 68–79. ♂ genital armature : 68, *Philiris sublutea sublutea* ; 69, *P. sublutea extensa* (claspers only) ; 70, *P. caerulea* ; 71, *P. apicalis* ; 72, *P. hypoxantha* ; 73, *P. griseldis gisella* ; 74, *P. philotas* ; 75, *P. philotoides* ; 76, *P. ianthina* ; 77, *P. agatha* ; 78, *P. montigena* ; 79, *P. praeclara*.

As pointed out on page 230, Bethune-Baker's female allotype of *gloriosa* is actually a female of *P. agatha* ; the configuration of the submarginal band on the fore wing above, and the buff coloration of the underside, are sufficient evidence of this.

Distribution, BRITISH NEW GUINEA : Angabunga River, 6000′ (*A. S. Meek*), 2 ♂ (including type).

***Philiris elegans* sp. n.**

(Pl. 3, fig. 148. Text-fig. 81)

The length of fore wing in the male is 17 mm.; that of the female varies from 17 to 18·5 mm. The male above presents the shape and appearance of a rather large *intensa* ; its blue colour is slightly lighter, but is of the same shade and degree of brilliance. All the blackish margins are wider, especially so at the apex of the fore wing ; on the hind wing, the black costal margin covers the whole area above vein 6, with the exception of a tiny portion where the blue colour penetrates over that vein in the angle of its juncture with vein 7. Beneath in both sexes, the shiny white ground is faintly clouded near the apex of the fore wing, and the margins of all wings, with brownish, and there is in the male a well marked patch of brownish scales towards the base of area 1 on the fore wing.

On the upperside, the female is superficially like that sex of *Holochila absimilis*, being dingy brown-black with a large oval white area on each wing, and a suffusion of bluish scales basally. The white area of the fore wing is situated almost centrally ; it covers a large part of areas 2 and 3, extending upwards into the more distal part of the cell, the base of area 4, and downwards into area 2. That of the hind wing extends from just above vein 4 to the costa, its lower edge reaching the margin of vein 7. The fringes are white, darkened at the vein-ends with fuscous.

In the male, the aedeagus is cylindrical, and bears externally numbers of backwardly directed points, arranged longitudinally in two irregular series, one series on the dorsal surface, the other on the ventral. A tuft of long cornuti is present in the vesica. The clasper is short and spoon-shaped, its inner edge is concave before its acute angled junction with the upper edge, from whence a curved ridge proceeds to the slightly produced apex.

Holotype ♂, DUTCH NEW GUINEA : Arfak Mountains, Mount Siwi, 15.v.1928 (*E. Mayr*), B.M. Type No. Rh. 16837.

Allotype ♀, as holotype, B.M. Type No. Rh. 16838.

Other material, DUTCH NEW GUINEA : as holotype, iv.–vi.1928, 3 ♀ ; Geelvink Bay, Coast District, xi.1914 (*A., E. & F. Pratt*), 1 ♀.

***Philiris lavendula* sp. n.**

(Pl. 3, fig. 149. Text-fig. 82)

A large species, the male fore wing measures 20 mm. The wings have a similar shape to those of *diana*, the primaries being acuminate. Above the colour is a smooth lavender—quite unlike that of any other *Philiris* ; all the veins are finely marked with black as they near the margins ; the costal and distal margins of the fore wing are narrowly black ; the apical area is broadly so, extending to 5 mm. from the apex. The outer half of the fringe is uninterrupted white, the inner portion fuscous. On the hind wing, the costa is broadly fuscous, the distal margin narrowly black ; the fringe is checkered with fuscous at the ends of veins 1 to 4, but is otherwise like that of the fore wing. Beneath, all wings are satin-white, unmarked except for a dusky shade in the base of cellule 1 on the primaries.

The aedeagus bears some resemblance to that of *fulgens*, but the outward pointing spur at the apex is much smaller ; it is accompanied by a series of smaller points as in that species, the lateral row however is replaced by a scattering of points situated more ventrally on the surface of the organ. A large patch of strong cornuti occupies most of the inner half of the vesica, and a subsidiary elongate series reaches outwards from it towards the orifice.

Holotype ♂, DUTCH NEW GUINEA : Geelvink Bay, Wandesi, 1892 (*W. Doherty*), B.M. Type No. Rh. 16839.

Philiris diana Waterhouse & Lyell

(i) ***P. diana diana*** Waterhouse & Lyell

(Text-fig. 83)

Philiris diana Waterhouse & Lyell, 1914 : 76, figs. 183, 270 and 271, Kuranda, Queensland.
Philiris diana Waterhouse & Lyell ; Waterhouse, 1932 : 138, pl. 20, figs. 4, 4A.

Distribution, AUSTRALIA : Queensland : Kuranda.

(ii) ***P. diana papuanus*** Wind & Clench

(Text-fig. 84)

Philiris diana papuanus Wind & Clench, 1947 : 6, Morobe District (Type !).

This race is entirely without a white cloud in the disc of the fore wing. The male genitalia are basically the same as those of the nominate race ; the claspers though larger and stouter, exhibit the same degree of asymmetry.

Distribution, BRITISH NEW GUINEA : Milne Bay, xi.1899 (*A. S. Meek*), 1 ♂.

Philiris ariadne Wind & Clench

(Text-fig. 85)

Philiris ariadne Wind & Clench, 1947 : 7, Morobe District (Type !).

The claspers of this species are asymmetrical as in *diana* ; the left one viewed ventrally is a tapering horn-like (bovine) structure with a sweeping turn outwards at approximately two-thirds its length ; a lateral view reveals that the terminal portion is flattened and bears finally a tooth-like projection directed at right angles ; the right clasper terminates prematurely in a clavate knob. A long snake-like line of cornuti in the vesica extends to quite half the length of the aedeagus.

Distribution, DUTCH NEW GUINEA : Weyland Mountains, Wai Sai River, 1000′, vi-vii.1920 (*C. F. & J. Pratt*), 1 ♂ ; BRITISH NEW GUINEA : Welsh River (*Weiske*), 1 ♂.

Philiris unipunctata (Bethune-Baker) **comb. n.**

(Text-fig. 86)

Candalides unipunctata Bethune-Baker, 1908 : 123, pl. 8, fig. 14, Biagi, Mambare River (Type !).

Closely related to *P. refusa*, but readily separated by its narrow dusky borders on the underside, and by the presence of distinct discoidal spots on that surface of all wings. The male genitalia do not differ from those of that species. Bethune-Baker does not mention the sex in his description, but the type is a female. The male upperside is suffused with blue metallic scaling over the white areas ; such a specimen is mentioned by that author, but he does not point out that it was a male character.

Distribution, New Guinea : Mambare River, Biagi, 5000′ i–vi.1906 (*A. S. Meek*), 1 ♀ (holotype) ; Angabunga River, above 6000′, xi–ii.1904–5 (*A. S. Meek*), 2 ♂, 3 ♀ ; as holotype, 1 ♂, 1 ♀ ; Aroa River (*A. S. Meek*), 3 ♂ ; Hydrographer Mountains, 2000′, i.1918 (*Eichhorn Bros.*), 1 ♀ ; Mafalu, 4000′, i.1934 (*L. E. Cheesman*), 1 ♀ ; Snow Mountains, near Oetakwa River, up to 3500′, x–xii.1910 (*A. S. Meek*), 1 ♂.

Philiris refusa (Grose-Smith) **comb. n.**

(i) ***P. refusa refusa*** (Grose-Smith)

Holochila refusa Grose-Smith, 1894 : 580, Humboldt Bay (Type !).
Candalides refusa (Grose-Smith) Grünberg (in Seitz), 1921 : pl. 145f.

Distribution, Dutch New Guinea : Humbolt Bay, ix–x.1892, 3 ♂, 1 ♀ (including holotype and allotype) ; Coast between Geelvink Bay and Humboldt Bay, 1886 (*W. Doherty*), 2 ♂ ; North New Guinea, 1 ♀.

(ii) ***P. refusa aequalis*** (Grose-Smith) **stat. n.**

Holochila aequalis Grose-Smith, 1897a : 517, Kapaur (Type !).

Distinguished from the nominate race by the dark borders on the underside of the wings being quite twice as wide.

Distribution, Dutch New Guinea : Kapaur, 24 ♂, 10 ♀ (including holotype and allotype) ; Dorey Bay, 1892 (*W. Doherty*), 5 ♂, 1 ♀ ; Fak Fak, 1905–7 (*A. E. Pratt*), 2 ♂ ; Arfak Mountains, Mount Siwi, v–vi. 1928 (*E. Mayr*), 3 ♂, 1 ♀ ; Wandammen Mountains, 3–4000′, xi. 1914 (*A., C. & F. Pratt*), 4 ♂ ; Snow Mountains, near Oetakwa River, up to 3500′, x–xii.1910 (*A. S. Meek*), 1 ♀ ; Upper Setekwa River, 2–3000′, viii.1910 (*A. S. Meek*), 1 ♀.

Philiris intensa (Butler)

(i) ***P. intensa butleri*** (Grose-Smith & Kirby) **stat. n.**

Holochila butleri Grose-Smith & Kirby, 1897 : 8, pl. 10, fig. 13, Halmaheira, Gilolo.

The male differs from that sex of the nominate race by the great extension of the black apical portion of the fore wing, which covers approximately one-third of the wing area, and by the wider black margin on the hind wing. The female is dingy brown-black above, with an indeterminate blue smear covering the bases of areas 2 and 3 on the fore wing. The cilia are white with black spots at the vein-ends.

Distribution, Moluccas : Batchian, 3 ♂, 1 ♀ ; Halmaheira, 1 ♀ ; Gilolo, 1 ♂.

(ii) ***P. intensa intensa*** (Butler)
(Text-fig. 87)

Holochila intensa Butler, 1876 : 245, Aru (Type !).
Holochila intensa Butler ; Grose-Smith & Kirby, 1897 : pl. 10, figs. 8–10.

In the male, the upperside is slightly lighter blue than that of the preceding, but the difference in tint is by no means as great as could be inferred from Grose-Smith & Kirby's figures. Aru females show a tendency for the blue and white on the upperside of the fore wing to be restricted, those from New Guinea exhibiting a marked extension of this area ; whereas those from the Louisiades and Trobriand Islands have on the hind wing a blue basal area, which extends well beyond the cell end and reveals a faint fuscous discoidal bar. In females from New Hanover and New Ireland there are pale areas on all wings, these areas being mostly white, with their more basal portions more silvery blue. These marked geographical differences in this species, and the next, suggest subspecific segregation, but in view of the uncertain correlation of the sexes in this genus, it is deemed inadvisable to provide them with names until their relationships can be corroborated.

Distribution, ARU, NEW GUINEA, LOUISIADES, and BISMARCKS.

(iii) ***P. intensa birou*** Wind & Clench

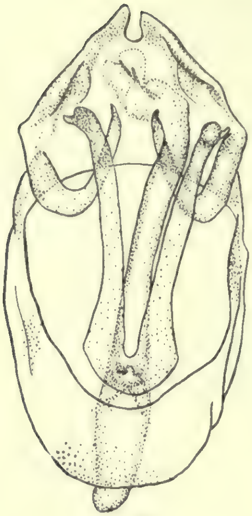
Philiris intensa birou Wind & Clench, 1947 : 10, Morobe District.

Philiris regina (Butler) **comb. n.**
(Text-fig. 88)

Holochila regina Butler, 1882 : 150, Duke of York Island (Type !).

The male is extremely like that of *intensa* ; it can be distinguished by the more restricted dark margins on all wings ; this is most noticeable in the apical area of the fore wing. On the hind wing, there is an irregularity on the inner edge of the juncture between the marginal and costal bands in cellule 6 ; whereas in *intensa* the marginal band joins the costal band in an even arc. The females exhibit a good deal of geographical variation. Those from Key, Mefor, Schouten Islands, Dorey and Snow Mountains, have all wings largely lavender-blue, without a suspicion of white. Those from Humboldt Bay and Mandated New Guinea have a whitish patch in the disc of the fore wing. British New Guinea females are without the whitish patches, the lavender-blue area is restricted on the fore wing and absent on the hind wing. The allotype from Duke of York Island is like this. Two females from New Britain are similar to those from Humbolt Bay, but have even larger white areas. A dusky cell-end bar is observable in females throughout the entire range. The duct of the bursa copulatrix is of approximately even width throughout its length ; whereas that of *intensa* is decidedly wider at its orifice.

Distribution, KEY ISLANDS, NEW GUINEA and NEW BRITAIN.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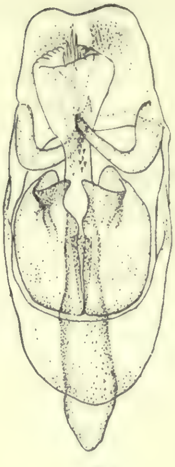
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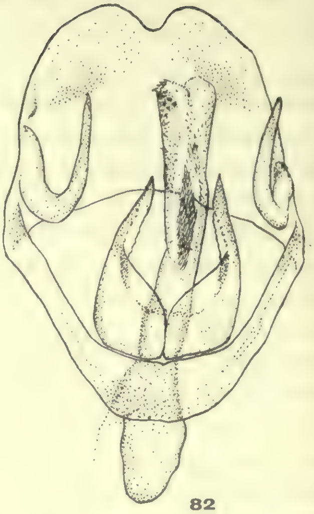
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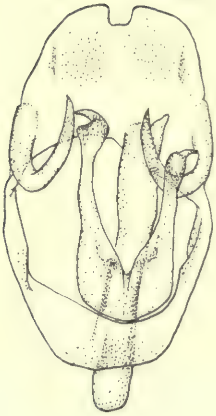
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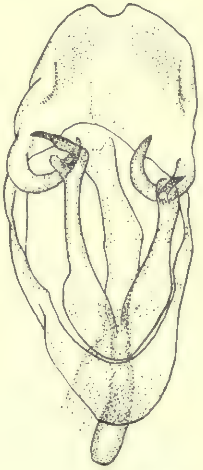
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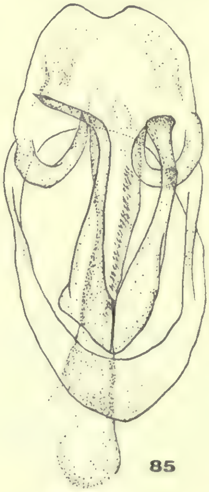
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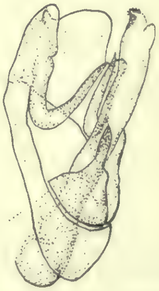
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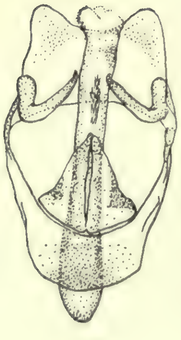
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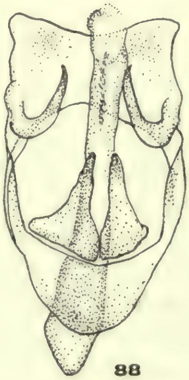
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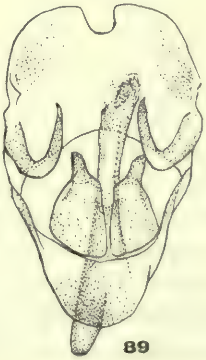
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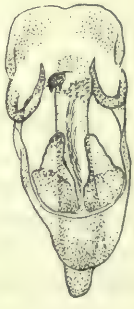
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Philiris zadne (Grose-Smith) **comb. n.**
(Text-fig. 89)

Holochila zadne Grose-Smith, 1898a : 107, Mailu, British New Guinea (Type !).
Holochila zadne Grose-Smith ; Grose-Smith, 1899, pl. (Or. Lyc.) 20, figs. 8, 9 and 10.

The acuminate fore wings, light blue ground colour, and narrow distal margin on the hind wings, render the male easily recognizable. Grose-Smith's figure 10 purports to be the female of this species. The specimen in the B. M. (N. H.) from which it was made is without antennae or abdomen, and is not distinguishable from the female of *intensa*. There is a strong probability that it is not the true female of *zadne*.

Distribution, British New Guinea : Mailu, vii.1895 (*Anthony*), 1 ♂, 1 ♀, (holotype and allotype).

Philiris kumusiensis **sp. n.**
(Pl. 4, fig. 152. Text-fig. 90)

Length of fore wing ; male, 11–13 mm. ; female, 13 mm. The upperside of the male is a much paler and softer shade of blue than that of *intensa*, its gloss being less intense ; this colour occupies only the basal two-thirds of the wings, the remainder being taken up with the wide black margins. On the fore wing the dark margin extends along the whole of the costa and upper part of the cell. The hind wing costa is whitish, and the cilia are whitish, checkered with fuscous at the vein-ends. The female is dusky earth-brown above ; on the fore wing, a nebulous grey patch is situated at the base of areas 1 and 2, and a streak of scattered blue scales runs from the base midway between veins 1 and 2.

The male aedeagus bears near its free end a strongly sclerotized structure, rather like a parrot's beak in profile, and directed towards the left ; to the right of this, there extends a wide irregular band of small points, all directed to the right, and reaching across the whole dorsal surface of the organ. An attenuated column of cornuti extends from the base of the vesica to quite near the orifice. The claspers are only one-third the length of the aedeagus ; they are bulbous at the base, but taper sharply towards the blunt apex, giving a somewhat pear-like appearance.

Holotype ♂, British New Guinea : Kumusi River, viii.1907 (*A. S. Meek*), B.M. Type No. Rh. 16840.

Allotype ♀, as holotype, vi.1907, B.M. Type No. Rh. 16841.

Other material, as holotype, 1 ♂.

Philiris argenteus (Rothschild) **comb. n.**
(Pl. 3, fig. 147. Text-fig. 91)

Candalides argenteus Rothschild, 1915 : 30, Utakwa River (Type !).

Similar in both sexes to *kumusiensis*, the male only differing by the extension of the blue colour over the fore wing cell, and by its rather narrower dusky margins.

Figs. 80–90. ♂ genital armature : 80, *Philiris gloriosa* ; 81, *P. elegans* ; 82, *P. lavendula* ; 83, *P. diana* ; 84, *P. papuanus* ; 85, *P. ariadne* ; 86, *P. unipunctata* ; 87, *P. intensa* ; 88, *P. regina* ; 89, *P. zadne* ; 90, *P. kumusiensis*.

The male claspers are roughly triangular and terminate in a point. The longer and more slender aedeagus bears a number of back directed points below the apex, and there are no cornuti in the vesica.

The hitherto undescribed female differs from *kumusiensis* in that the nebulous grey-blue patch on the fore wing is more extensive and is produced towards the base of the wing, covering the basal portion of area 1.

Neallotype ♀, DUTCH NEW GUINEA : Snow Mountains, Upper Setekwa River, 2–3000′, vii.1910 (*A. S. Meek*), B.M. Type No. Rh. 16842.

Other material, DUTCH NEW GUINEA : Utakwa River, ii.1913 (*A. F. R. Wollaston*), 1 ♂ (holotype).

Philiris kamerungae Waterhouse

(i) ***P. kamerungae kamerungae*** Waterhouse

Philiris kamerungae Waterhouse, 1902 : 650, Queensland.
Philiris kamerungae Waterhouse ; Waterhouse, 1914 : 77, figs. 171–172.
Philiris kamerungae Waterhouse ; Waterhouse, 1932 : 137, pl. 20, figs. 2–2A.

The male is lighter blue above than *nitens* ; it has a white area in the disc of the fore wing, and another in the apical portion of the hind wing.

Distribution, AUSTRALIA : Queensland : Cairns ; Kuranda ; Mulgrave River.

(ii) ***P. kamerungae lucina*** Waterhouse & Lyell

Philiris kamerungae lucina Waterhouse & Lyell, 1914 : 77, Cape York.

Said to have the blue colour replaced by green in both sexes. This insect is not represented in the B.M. (N.H.).

Philiris nitens (Grose-Smith) **comb. n.**

(i) ***P. nitens nitens*** (Grose-Smith)

(Text-fig. 92)

Holochila nitens Grose-Smith, 1898a : 107, North Queensland (Type !).
Holochila nitens Grose-Smith ; Grose-Smith, 1899, pl. (Or. Lyc.) 20, figs. 3–4.

Waterhouse (1902: 653) considered that *nitens* was synonymic with *innotatus* and *ilias* ; apparently he had no first-hand knowledge of the insect, and he does not mention the species in his subsequent publications. Examination of the male genitalia of the type shows affinity with those of *kamerungae*, and when more material is available for study, the two may prove to be conspecific forms or races.

The male *nitens* has a rather more purple tinge to the blue ground colour, a much wider (2 mm.) marginal band on the hind wing, and is entirely without a discal white patch on the fore wing. All the fringes are white.

Distribution, AUSTRALIA : Queensland : without further data, 1 ♂ (holotype) ; Mulgrave River, ii–iv.1907, 1 ♂.

(ii) ***P. nitens restricta*** **ssp. n.**

In the male fore wing the blue ground colour is restricted, whereas, in *nitens nitens* this colour extends widely over the lower half of the cell, and the base of cellule 2 ; in *restricta*, it only crosses the median vein at the basal end, and barely protrudes over the base of vein 2, these areas being separated by a wedge of dusky brown reaching downward to the junction of the median vein and vein 2. On the hind wing the costal region is whitish ochreous shading to fuscous, the remainder of the wing is like that of the nominate race.

The female, on all wings, is dusky brown, brightened on the fore wing by an individually variable amount of blue scaling at the base of areas 1 and 2. The costa of the hind wing is broadly white extending to vein 7 ; in one example, this extends over vein 7 as a nebulous pale spot, peppered with brown scales.

Holotype ♂, AUSTRALIA : Queensland : Cedar Bay (*A. S. Meek*), B.M. Type No. Rh. 16843. Allotype ♀, as holotype, B.M. Type No. Rh. 16844.

Other material, as holotype, 2 ♂, 2 ♀.

Philiris azula Wind & Clench
(Text-fig. 93)

Philiris azula Wind & Clench, 1947 : 8, Morobe District (Type !).

It may be permitted to amplify the terms of the original colour description " slightly purplish blue " by noting that the colour is distinctly blue, only acquiring a slight purple tinge when the light falls obliquely. The exact blue shade is not repeated in any other *Philiris* species.

The cylindrical aedeagus exhibits terminally a strongly sclerotic sausage-shaped structure, bearing a number of small blunt points. A compact bunch of long cornuti are present in the vesica. The claspers are short, bulbous at the base, with a distinct shoulder on the outer margin ; they terminate in a blunt point.

The species is not represented in the B.M. (N.H.).

Philiris angabunga (Bethune-Baker) **comb. n.**
(Text-fig. 94)

Candalides angabunga Bethune-Baker, 1908 : 123, pl. 9, fig. 5, Angabunga River (Type !).

Bethune-Baker was mistaken when he described the type as a female ; examination of the genitalia reveals that it is an undoubted male. The discovery of a female having similar discoidal markings on the underside serves to confirm this.

The female is brown-black above, with a large rounded white spot in the submedian area of the fore wing, and a strong blue suffusion extending from the base, below the median vein, to the inner edge of the white spot ; below vein 1, the same colour extends along the hind margin to merge with the brown-black in the distal region. The hind wings are less intensely blue basally ; they bear a large white spot covering most of the outer half of the wing, and extending from the costa to vein 4. All the fringes are white, strongly checkered with fuscous at the vein-ends. The underside is like that of the male.

Neallotype ♀, BRITISH NEW GUINEA : Angabunga River, 6000′, xi–ii.1904–5 (*A. S. Meek*), B.M. Type No. Rh. 16845.

Other material, as neallotype, 1 ♂ (holotype).

Philiris fulgens (Grose-Smith & Kirby) **comb. n.**

(i) *P. fulgens fulgens* (Grose-Smith & Kirby)

(Text-fig. 95)

Holochila fulgens Grose-Smith & Kirby, 1897 : 8, pl. 10, figs. 14–15, Amboina (Type !).
Candalides fulgens (Grose-Smith & Kirby) Grünberg (in Seitz), 1921 : 854, pl. 145g.

Distribution, MOLUCCAS : Amboina (*Wallace*), 1 ♂ (holotype) ; Amboina (*Hewitson*), 1 ♂ ; Central Ceram, 3000′, xii.1919 (*C., F. & J. Pratt*), 1 ♂.

(ii) *P. fulgens bicolorata* Wind & Clench

Philiris fulgens bicolorata Wind & Clench, 1947 : 9, Aru Islands.

Not represented in B.M. (N.H.).

(iii) *P. fulgens septentrionalis* Joicey & Talbot

Philiris fulgens septentrionalis Joicey & Talbot, 1916 : 76, Biak (Type !).

Distribution, DUTCH NEW GUINEA : Schouten Islands, Biak, vi.1914 (*A., C. & F. Pratt*), 1 ♂, (holotype) ; Kapaur, 1 ♂.

(iv) *P. fulgens kurandae* Waterhouse **stat. n.**

Philiris kurandae Waterhouse, 1902 : 651, Cairns District.
Philiris kurandae Waterhouse ; Waterhouse, 1932 : 138, pl. 20, figs. 3–3A.

Distribution, AUSTRALIA : Queensland : Kuranda ; Cedar Bay.

Philiris remissa **sp. n.**

(Pl. 4, fig. 153)

Length of fore wing in the male : 16 mm. The fore wing apex is somewhat acute, despite a slight prominence at vein 4 in the distal margin. All wings are shining purple ; their blackish margins are 1 to 2 mm. wide, widening at vein 3 into the blackish apical area. Beneath, the ground colour has a slightly cream tinge, which is not found in the previous species. There is a brown smear at the base of cellule 1 of the fore wing.

Holotype ♂, BRITISH NEW GUINEA : Kumusi River, vii.1907 (*A. S. Meek*), B.M. Type No. Rh. 16846.

Although this species is closely related to *fulgens*, and the male genitalia of the two cannot be differentiated, in view of the obvious macroscopical characters and the shortage of material, it is thought advisable to treat *remissa* as a good species.

Philiris moluccana **sp. n.**

(Text-fig. 96)

The fore wing in both sexes measures 15–16 mm.; its apex is obtuse. In the male, on all wings the colour changes by light refraction from rose-brown to bright bluish purple ; the wide margins are dusky brown, and so merge with the ground colour, especially the rose-brown tint, that their inner limits are difficult to determine. Above vein 6 on the hind wing, there is a wide longitudinal streak of bluish purple, extending almost to the apex, and quite unaffected by refraction. The fringes are somewhat tattered but appear to be mainly fuscous, those of the hind wing however showing traces of whitish scales between the vein-ends. In the female the wings are dusky earth-brown, with on the fore wing a wide grey-blue smear extending below the median vein from the base to within 4 mm. of the distal margin.

Beneath, both sexes are satin-white with a faint greyish tinge, only marked by the hind marginal black spot on the hind wing, and the black fringe spots at the vein-ends.

Holotype ♂, MOLUCCAS : Obi, Laiwui, ix.1897 (*W. Doherty*), B.M. Type No. Rh. 16847.

Allotype ♀, as holotype, B.M. Type No. Rh. 16848.

Other material, as holotype, 1 ♀.

Philiris mayri Wind & Clench
(Text-fig. 97)

Philiris mayri Wind & Clench, 1947 : 14, Arfak Mountains (Type !).

In the B.M. (N.H.) is a short series of both sexes, which were evidently taken by Dr. Mayr with the type ; their identity has now been established by careful comparison with the type.

A trifling but unique character not mentioned in the original description is observable in the male fore wings ; it consists of a scattering of white scales along the veins in the disc of the wing, obvious under a lens, and just visible to the naked eye.

The hitherto undescribed female is similar to that of *subovata;* the ground colour above is dingy brown-black, and the central rounded white spot on the fore wing is even larger than in that species, extending from vein 1 to vein 4, and from the median vein to within 3 mm. of the margin. Scattered blue scales are present at the base of the wing. On the hind wing the costa is whitish to below vein 7. In contrast to the ochreous tipped antennal knobs of *subovata*, those of *mayri* are completely black.

Neallotype ♀, DUTCH NEW GUINEA : Arfak Mountains, Mount Siwi, 800 m., 15.v.1928 (*E. Mayr*), B.M. Type No. Rh. 16849.

Other material, DUTCH NEW GUINEA : as neallotype, iv–vi.1928, 4 ♂, 3 ♀ ; Momi, 2500′, iii.1910 (*C. & F. Pratt*), 1 ♀.

Philiris ziska (Grose-Smith) **comb. n.**
(Text-fig. 98)

Holochila ziska Grose-Smith, 1898 : 11, pl. 13, figs. 11–12, Kapaur (Type !), ♂ nec ♀.
Candalides pratti Bethune-Baker, 1908 : 122, pl. 8, fig. 13, Dutch New Guinea (Type !), **syn. n.**

The female described and figured by Grose-Smith cannot be the true female of this species, as its hind wing beneath bears no indication of a black hind-marginal dot. It bears some resemblance to that sex of *P. praeclara*, but is more heavily bordered with blackish, and the bordering of the hind wing extends in wide rays along the submedian veins. Its true identity cannot be ascertained until more material is available.

Distribution, NEW GUINEA : Waigeu (*Wallace*), 1 ♂ ; Kapaur (*W. Doherty*), 4 ♂ (including type) ; Dorey (*W. Doherty*), 1 ♂ ; Fak Fak, v–vi.1905 (*A. E. Pratt*), 1 ♂

(type of *pratti*) ; Ninay Valley (*A. E. Pratt*), 1 ♂ ; Astrolabe Range (*Dodd*), 1 ♂ ; Humboldt Bay, ix–x.1892 (*W. Doherty*), 1 ♂ ; Snow Mountains, near Oetakwa River, x–xii.1910 (*A. S. Meek*), 1 ♂ ; Utakwa River, Base Camp, i.1913 (*A. F. R. Wollaston*), 1 ♂ ; Hydrographer Mountains (*A. S. Meek*), 1 ♂ ; Milne Bay (*A. S. Meek*), 1 ♂ ; Welsh River (*Weiske*), 1 ♂.

Philiris misimensis Wind & Clench

(Text-fig. 99)

Philiris misimensis Wind & Clench, 1947 : 15, Morobe District (Type !).

Only known from the male holotype, this species is similar on the upperside to the male of *P. philotoides*, its shape, dusky purple colour, and size, all being as in that species. The dark margins of the fore wing are decidedly wider, especially so at the apex. As indicated in the key the distinctive underside is a ready means of identification.

The aedeagus is widened towards its extremity, and exhibits on the left side of this widening a densely sclerotised structure, bearing a series of outwardly directed teeth of various sizes. The vesica contains an elongate patch of stout cornuti. The claspers are short and curved, each terminates in an inwardly directed point.

The species is not represented in the B.M. (N.H.).

***Philiris tombara* sp. n.**

(Pl. 4, fig. 165. Text-fig. 100)

Both sexes are like *lucescens* in appearance and size. In the male, the fore wing apex is more widely black, extending from 6 mm. at the apex, and tapering sharply to 1·5 mm. at the tornus. The black margin of the hind wing is also wider, more than 1 mm., expanding in cellule 6 to 2·5 mm. The costa is dingy fuscous. On the fore wing of the female, the basal blue scarcely extends beyond the origin of vein 2 ; the white discal half-band is clear white, spreading from the hind margin over the central third of area 1, and the bases of areas 2, 3 and 4. The hind wing is mainly dusky brown, of a paler tint than the fore wing, with a few scattered blue scales toward the base, and the costa laved with white. Both sexes are like *lucescens* beneath.

The male claspers are roughly triangular, with a rounded apex ; the aedeagus is long and slender, with only one elongate patch of rather weak cornuti.

Holotype ♂, Bismarck Archipelago : New Ireland, ii–iii. (*A. F. Eichhorn*), B.M. Type No. Rh. 16850.

Allotype ♀, as holotype, B.M. Type No. Rh. 16851.

Other material, Bismarck Archipelago : New Ireland, xii–ii.1923–4 (*A. F. Eichhorn*), 3 ♀ ; New Britain, Talesea, iii–iv.1923 (*A. F. Eichhorn*), 1 ♂, 2 ♀ ; Rook Island, viii.1913 (*A. S. Meek*), 1 ♂, 1 ♀.

***Philiris phengotes* sp. n.**

(Pl. 4, fig. 160. Text-fig. 101)

As compared with *moira*, the male has broader wings ; the fore wing apex is even more obtuse, and its distal margin more convex. All the wings above are an intense blue-purple, which from a side view reveals a refractive reddish lustre ; the margins are narrowly black, only widening to approximately 2 mm. at the fore wing apex. The cilia are dusky brown, those of the hind wing being distinctly lighter in colour between the vein-ends. In the female, the colour is dusky brown ; a wash of light blue scales covers the basal part of area 1 on the fore wing, and merges with the rounded white spot occupying the bases of areas 2 and 3 ; the hind wing costa is broadly white. Beneath, both sexes are rather soiled white, with only a dim lustre. The black spot is present near the hind margin of the hind wing.

The male claspers viewed ventrally are roughly oval, twice as long as broad, and with an inconspicuous and very obtuse angle at the apex. In the vesica, the innermost patch of cornuti is larger than that of *innotatus*, and the central patch also is greater in extent, and consists of more closely packed spines. The outermost series is similar to that of *innotatus*.

Holotype ♂, BRITISH NEW GUINEA : Kokoda, 1200′, iv.1933 (*L. E. Cheesman*), B.M. Type No. Rh. 16852.

Allotype ♀, as holotype, B.M. Type No. Rh. 16853.

Other material, as holotype, 1 ♂, 1 ♀.

Philiris dinawa (Bethune-Baker) **comb. n.**

(Text-fig. 102)

Candalides dinawa Bethune-Baker, 1908 : 122, Dinawa (Type !).

The male scarcely differs from *moira* above ; but whereas the white underside of that species has a matt surface that of *dinawa* glistens, and in certain lights shows a subtle suspicion of shining bronze.

Distribution, BRITISH NEW GUINEA : Dinawa, 4000′ (*A. E. Pratt*), 1 ♂, 1 ♀ (holotype and allotype) ; Upper Aroa River (*A. S. Meek*), 1 ♀ ; Hydrographer Mountains (*Eichhorn Bros.*), 1 ♀.

Philiris melanacra **sp. n.**

(Pl. 4, fig. 154. Text-fig. 103)

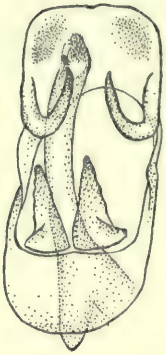
Both sexes are of the same shape, size and appearance as *lucescens*. In the male above, the ground colour is dull purple, without the strong blue refraction of that species. In the female, the blue areas are more restricted than in that sex of *lucescens*, and the white discal area on the fore wing is only represented by a lightening of the blue. A dusky discocellular lunule closes the hind wing cell. The underside and fringes are as in the species mentioned above.

The male genitalia are quite distinct, and differ from those of *lucescens* as follows : the uncus lobes are produced to form two horn-like structures ; the sub-unci are shorter ; the claspers are bifid, each terminating in two lobes, the ventral lobe being more strongly sclerotized ; in the aedeagus, the vesical cornuti are much longer.

Holotype ♂, BISMARCK ARCHIPELAGO : Witu or French Islands, vi.1925 (*A. F. Eichhorn*), B.M. Type No. Rh. 16854.

Allotype ♀, as holotype, B.M. Type No. Rh. 16855.

Other material, BISMARCK ARCHIPELAGO : as holotype, vi–viii.1925, 4 ♂, 4 ♀ ; New Ireland, xi–xii.1923 (*A. F. Eichhorn*), 1 ♀ ; Neupommern, Herbertshohe (*Hagen*), 2 ♂ ; New Britain, 1 ♀ ; Rook Island, vii–viii.1913 (*A. S. Meek*), 1 ♂, 3 ♀.



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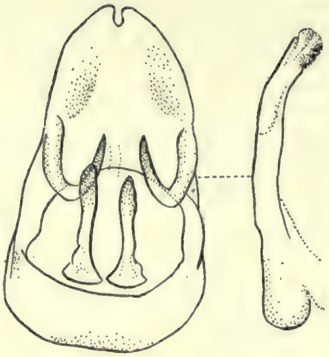

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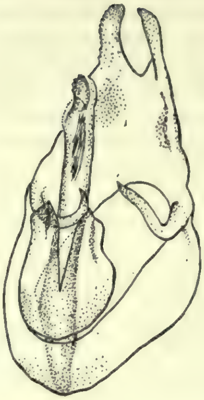

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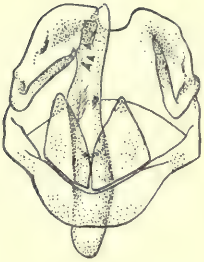

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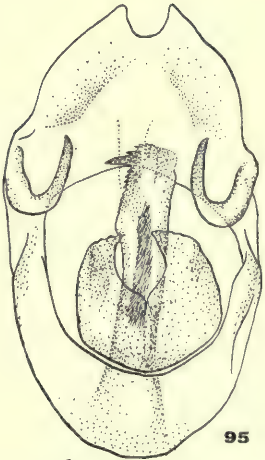

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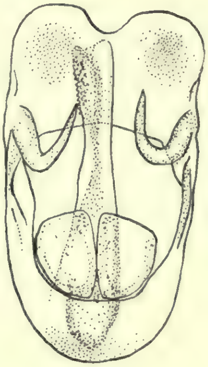

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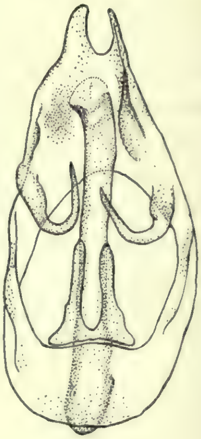

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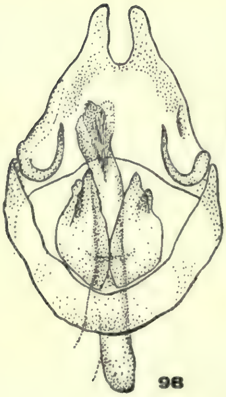

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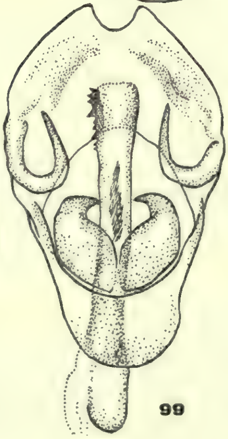

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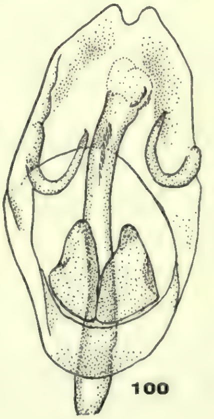

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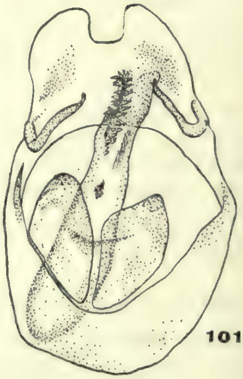

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Philiris lucescens **sp. n.**
(Pl. 4, fig. 156. Text-fig. 104)

The fore wing measures 14 to 15 mm.; its apex is acute, and its distal margin only slightly rounded. On all wings, the purple ground is the same colour as that of *moira*, exhibiting a distinctly blue refractive lustre. The black margin of the fore wing commences narrowly at the tornus, widening rapidly towards the apex to a width of 5 mm., and then narrowing again to 2 mm. along the costa. On the hind wing, the distal margin is narrowly black ; it is not widened below the apex as is that of *moira* ; the costal margin is widely pale fawn but this colour is usually hidden by the fore wing. In the female, the basal blue scaling on the fore wing extends over area 1 and the lower half of the cell, and gradually merges with the dusky margins ; it encloses a white area situated in the base of areas 2 and 3. The hind wing is blue at the base, becoming lighter, and intermixed with some fuscous scaling as it approaches the wide dusky brown margin. In both sexes, the fringes are brown basally, and at the vein-ends, the intervals being filled in with white. The slightly lustrous white underside is relieved only by the black spot near the hind margin of the hind wing, and the darkened bases of the fringes.

In all the males dissected, the claspers are asymmetrical, the left one being outwardly concave, and terminating in a blunt point ; in each case the right clasper has this point depressed, appearing as if distorted by pressure. The innermost patch of cornuti in the vesica is not observable ; it is either absent or united with the middle patch. This middle patch is very densely spined, and is at least four times the extent of that of *phengotes*. The final series of cornuti is scattered, and merges with the small points on the terminal lobe.

Holotype ♂, BISMARCK ARCHIPELAGO : Rook Island, vi–vii.1913 (*A. S. Meek*), B.M. Type No. Rh. 16856.

Allotype ♀, as holotype, B.M. Type No. Rh. 16857.

Other material, BISMARCK ARCHIPELAGO : as holotype, 1 ♂ ; New Britain, Talesea, i–iv.1925 (*A. F. Eichhorn*), 3 ♂.

Philiris innotatus (Miskin)
(i) ***P. innotatus innotatus*** (Miskin)
(Text-fig. 105)

Pseudodipsas innotatus Miskin, 1874 : 165, Brisbane.
Philiris ilias innotatus (Miskin) Waterhouse, 1932 : 137, pl. 20, figs. 1–1A.
Philiris innotatus (Miskin) ; Wind & Clench, 1947 : 11.

Viewed ventrally the male claspers are concave, and terminate in an inwardly directed subrectangular apex ; their outer margin is straight, but the appearance of these organs is greatly influenced by the angle from which they are viewed. The cylindrical aedeagus contains within the vesica three separate clusters of cornuti : the first is an oval patch, consisting of a dense mass of short strong points, and is situated deep in the vesica ; above this, a number of much longer and paler spines run upwards in series; finally, a line of stout strongly sclerotic points, diminishing in size, extend to the orifice, spreading over on to the external surface of the aedeagus.

Distribution, AUSTRALIA : Brisbane.

FIGS. 91–101. ♂ genital armature : 91, *Philiris argenteus* ; 92, *P. nitens* ; 93, *P. azula* ; 94, *P. angabunga* ; 95, *P. fulgens* ; 96, *P. moluccana* ; 97, *P. mayri* ; 98, *P. ziska* ; 99, *P. misimensis* ; 100, *P. tombara* ; 101, *P. phengotes*.

(ii) ***P. innotatus evinculis*** Wind & Clench

Philiris innotatus evinculis Wind & Clench, 1947 : 11, N. Queensland.

Distribution, AUSTRALIA : Northern Queensland.

***Philiris riuensis* sp. n.**

(Pl. 4, fig. 163. Text-fig. 106)

In the male very similar to *phengotes*, it has the same size, wing shape, and reddish refractive lustre ; it can be differentiated by the decidedly wider dark margins on all wings, that of the fore wing attaining a width of 3 mm. at the apex. The dusky brown female bears some resemblance to that sex of *innotatus ;* it has an even greater expanse of light shining blue on the fore wing, which colour covers the lower half of the cell, and extends broadly over the base and disc of the wing, to within 2 mm. of the margin in area 2. A blue wash spreads from the base of the hind wing in most individuals, and in some spreads over most of the cell, with an additional streak running outwards below the median vein and vein 2. The fringes are white, checkered with black in both sexes.

The male claspers terminate in an acute point, and the cornuti of the central patch in the vesica are more feeble and less closely arranged than in *philotes*.

Holotype ♂, LOUISIADE ARCHIPELAGO : Sudest Island, Mt. Riu, 2000′, v.1916 (*Eichhorn Bros.*), B.M. Type No. Rh. 16858.

Allotype ♀, as holotype, iii.1916, B.M. Type No. Rh. 16859.

Other material, LOUISIADE ARCHIPELAGO: as holotype, ii–v. 1916, 1 ♂, 8 ♀; St. Aignan, viii–xi.1897 (*A. S. Meek*), 2 ♂, 4 ♀.

Philiris moira (Grose-Smith)

(i) ***P. moira moira*** (Grose-Smith)

(Text-fig. 107)

Holochila moira Grose-Smith, 1899 : 18, pl. (Or. Lyc.) 18, figs. 9–11, Fergusson Island (Type !), ♂ nec ♀.

The wings of the male are more intensely purple on the upperside, and the fore wings are less pointed than in the preceding species. The female allotype is probably misplaced here. In the male, only the extreme tip of the antennal club is touched with yellow, whereas in the allotype the club is covered with that colour to the extent of the terminal half above, and two-thirds below. The insect in question is most probably an *intensa* female. Females with antennae similar to those of the male, and with a large pale blue patch on the fore wing may prove to be true *moira* females.

The male genitalia are similar to those of *innotatus* ; they differ in the shape of the clasper, which appears from a ventral view-point as an inverted pear, with a blunt projection on its distal edge. In the vesica, the series of strong points running towards the orifice are almost twice as large as those of that species.

Distribution, NEW GUINEA : Dorey ; Kapaur ; Weyland Mountains ; Humboldt Bay ; Erina ; Snow Mountains ; Dampier Island ; Vulcan Island ; Fergusson Island.

(ii) ***P. moira putih*** Wind & Clench

Philiris moira putih Wind & Clench, 1947 : 12, Port Moresby, British New Guinea.

It has not been possible to see the type, or to identify specimens of this subspecies.

Philiris ignobilis (Joicey & Talbot) **comb. n.**

(Text-fig. 108)

Candalides ignobilis Joicey & Talbot, 1916a : 81, Wandammen Mountains (Type !).

The male claspers show considerable variation in length ; the figure depicts those of the type.

Distribution, ARU-NEW GUINEA : Dobo, 1 ♂ ; Aru, 1 ♂ ; Kapaur, 1 ♂ ; Wandammen Mountains 3000–4000′, xi.1914 (*Pratt Bros.*), 1 ♂ (holotype) ; Mt. Goliath, 5000′, iii.1911 (*A. S. Meek*), 1 ♂ ; Mambare River, Biagi, 5000′, iv.1906 (*A. S Meek*), 1 ♂ ; Owgarra, v.1903 (*A. S. Meek*), 1 ♂ ; Kumusi River, vi.1907 (*A. S. Meek*), 1 ♂ ; Goodenough Island, 2500–4000′, v.1913 (*A. S. Meek*), 1 ♂.

Philiris albicostalis **sp. n.**

(Pl. 4, fig. 159. Text-fig. 109)

The male fore wing measures 15 mm. The colour above shades by refraction from brownish purple to bright blue-purple ; all wing margins are broadly brown black ; that of the fore wing measuring 2 mm. at the hind angle, increasing slightly to vein 4, from whence it broadens rapidly to 6 mm. at the apex. On the hind wing, the margin is rather narrower, and only reaches vein 7 ; the costa is broadly white as far as vein 6. The underside is like that of *ilias*.

Holotype ♂, MANDATED NEW GUINEA : Astrolabe Bay (*C. Wahnes*), B.M. Type No. Rh. 16860.

Philiris marginata (Grose-Smith)

(Text-fig. 110)

Holochila marginata Grose-Smith, 1894 : 579, Humboldt Bay (Type !).
Holochila marginata Grose-Smith ; Grose-Smith, 1898, pl. (Or. Lyc.) 13, figs. 9–10.

The male claspers are triangular, with sharply pointed apices ; the aedeagus is cylindrical, reduced in width before the apex, and contains in the vesica a single bunch of strong cornuti.

Distribution, DUTCH NEW GUINEA : Humboldt Bay, ix–x.1892 (*W. Doherty*), 1 ♂ (holotype).

Philiris doreia **sp. n.**

(Text-fig. 111)

Of the same size and appearance as *P. ilias*, but can be readily recognized by the much broader black apex on the fore wing, and by the costal margin of the hind wing being widely washed with tawny white. The purple ground colour is more intense, and shows a distinct reddish glow in certain lights.

The male claspers are very like those of *oreas*, but their apices are more produced. The aedeagus is long and slender ; its vesica is without cornuti.

Holotype ♂, Dutch New Guinea : Dorey, vi.1897 (*W. Doherty*), B.M. Type No. Rh. 16861.

Other material, Dutch New Guinea : Kapaur (*Crowley Bequest*), 1 ♂.

***Philiris goliathensis* sp. n.**

(Pl. 4, fig. 166. Text-fig. 112)

The male has a fore wing measurement of 15 mm. On the upperside, the purple colour has a bright violet reflection, which separates the insect at once from the dusky purple *vicina* which follows. On the fore wing, the blackish margin is narrow in the basal half of the costa, never penetrating into the cell ; beyond this it widens, filling the whole apical region, including cellule 5, and all but the basal portion of cellule 4, from whence its inner edge swings in an even arc to meet the hind margin 2 mm. from the hind angle. Black scales darken the distal parts of the submedian veins. The veins of the hind wing are similarly darkened, and the dark margins are narrow, being about 1 mm. in width. The costa is pale brownish buff. All the fringes are checkered at the vein-ends, this is especially noticeable on the hind wing. Beneath, all wings are shining pearly white ; there is a well marked brownish patch at the base of cellule 1 on the fore wing. The hind wing is unmarked except for the small black dot near the hind margin.

The male claspers are triangular as in the previous species, but their much sharper apices are slightly curved. The short stout aedeagus contains within the vesica a small bunch of short cornuti, lying in the withdrawn organ, opposite a much larger bunch of longer ones.

Holotype ♂, Dutch New Guinea : Mt. Goliath, 5000′, iii.1911 (*A. S. Meek*), B.M. Type No. Rh. 16862.

***Philiris vicina* (Grose-Smith) comb. n.**

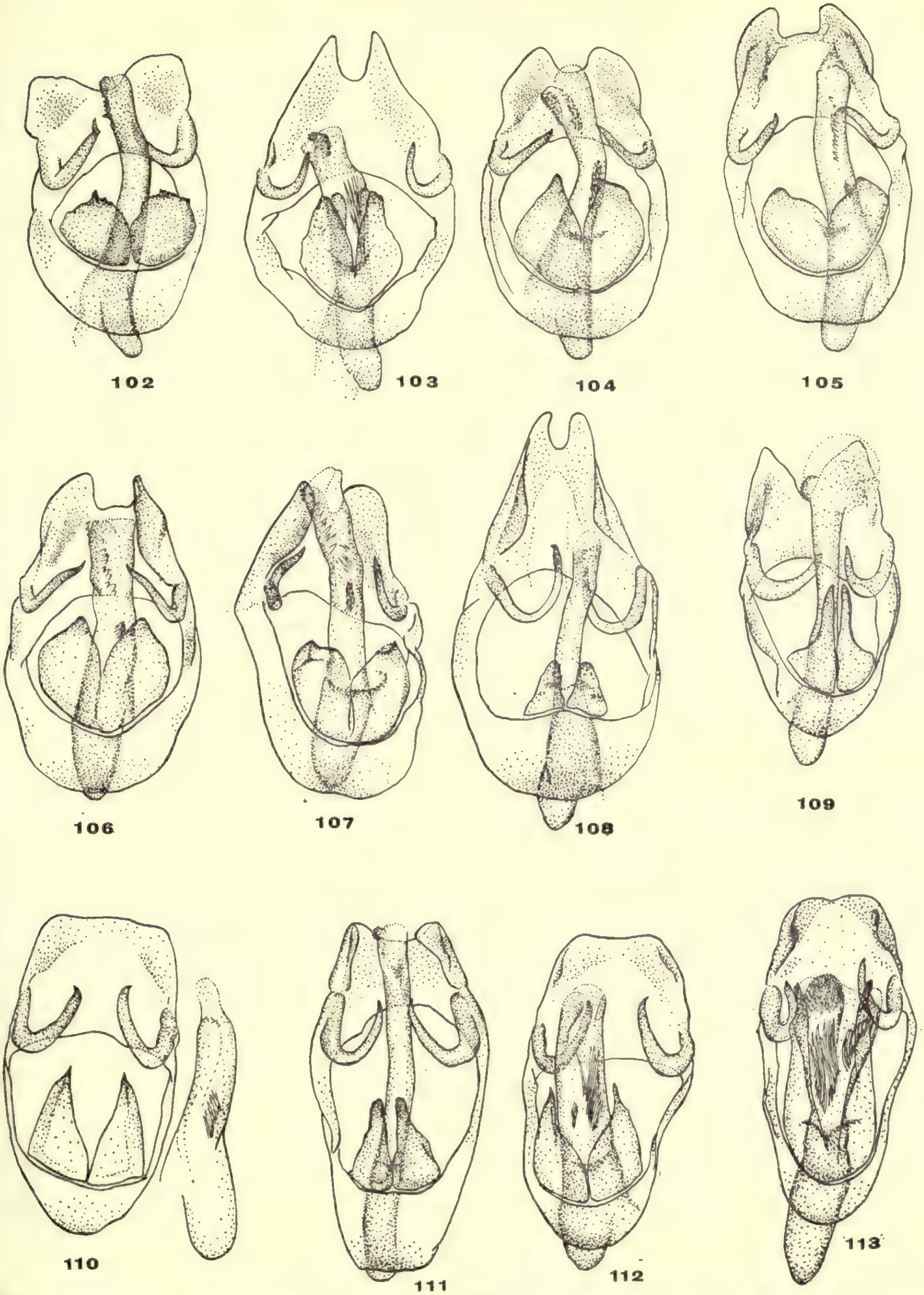
(Text-fig. 113)

Holochila vicina Grose-Smith, 1898a : 107, Mailu, British New Guinea (Type !).
Holochila vicina Grose-Smith ; Grose-Smith, 1899 : pl. (Or. Lyc.) 20, figs. 5–6 (nec female fig. 7).

A female with the same data as that of the male holotype is in the B.M. (N.H.) ; it bears Grose-Smith's label "*vicina* Gr.-Sm., Type ♀", and is presumably the original of that author's fig. 7 ; there is no description of that sex. Examination of the specimen precludes its acceptance as the true *vicina* female. The yellow colour on the ends of the antennae is brighter and more extensive than in the holotype, even on the upper surface ; the white underside of the wings has none of the pearly gloss to be seen in the male. It may prove to be an *extensa* or *regina* female.

The conformation of the aedeagus in the male is most distinctive ; it is contracted at just below half its length, and from there bells out in a trumpet-like formation, terminating in two lobular lips, one dorsal the other ventral. The dorsal lip is strongly sclerotized, saddle-shaped, and hinged at its base, both are covered with tiny spicules. In the vesica, there are two opposing groups of very large cornuti, those in the more ventral group being much the larger, measuring 3 to 4 mm. The clasper is elongate, with a finger-like apex, and an outwardly directed shoulder.

Distribution, New Guinea : Mailu, vii.1895 (*Anthony*), 1 ♂ (holotype) ; Hydrographer Mountains, 2500′, iv.1918 (*Eichhorn Bros.*), 1 ♂ ; Eilanden River, xii.1910 (*A. S. Meek*), 2 ♂; Mount Goliath, 5000′, iii.1911 (*A. S. Meek*), 2 ♂.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FIGS. 102–113. ♂ genital armature : 102, *Philiris dinawa ;* 103, *P. melanacra ;* 104, *P. lucescens ;* 105, *P. innotatus ;* 106, *P. riuensis ;* 107, *P. moira ;* 108, *P. ignobilis ;* 109, *P. albicostalis ;* 110, *P. marginata ;* 111, *P. doreia ;* 112, *P. goliathensis ;* 113, *P. vicina.*

Philiris albihumerata sp. n.
(Pl. 4, fig. 161. Text-fig. 114)

The length of the fore wing in both sexes is 14 to 15 mm. The male above is very similar to *ilias* Felder, but the dusky margins are quite twice as broad as those of that species. Its purple colour has a bright violet tone.

The female is dusky brown on all wings, with on the fore wing, a diffuse blue patch at the base of area 1, which is continued into the base of area 2 as grey-blue smear. Both sexes beneath are white with only a feeble lustre, the small black spot being present above the hind margin of the hind wing. As indicated in the key, the fringes in both sexes are not darkened at the ends of veins 5, 6 and 7, on the hind wing ; the other vein-ends are darkened. This character obtains throughout the series, and does not occur in any other species examined.

The male aedeagus is long and slender, and of even width, only expanding somewhat before the apex ; on either side at this point, there arises a rounded flange, which is covered with small spicules. The claspers are less than one-third the length of the aedeagus ; they are of a smooth leaf-like shape, and arise from a broader base.

Holotype ♂, DUTCH NEW GUINEA : Snow Mountains, Upper Setekwa River, 2–3000′, vii.1910 (*A. S. Meek*), B.M. Type No. Rh. 16863.

Allotype ♀, as holotype, B.M. Type No. Rh. 16864.

Other material, DUTCH NEW GUINEA : as holotype, 2 ♂, 1 ♀ ; Near Oetakwa River, up to 3500′, x–xii.1910 (*A. S. Meek*), 1 ♂, 3 ♀ ; Utakwa river, Base Camp, i.1913 (*A. S. Meek*), 1 ♂, 1 ♀ ; Mount Goliath, 5000′, iii.1911 (*A. S. Meek*), 1 ♀ ; Andai, Dorey Bay, 1882 (*W. Doherty*), 1 ♂.

Philiris satis sp. n.
(Pl. 4, fig. 158. Text-fig. 115)

The length of the fore wing in both sexes is 15 mm. On the upper side the male is shining purple ; the veins are scaled black. It differs from *ilias* and other allied species in possessing on all wings a wide (2 mm.) blackish marginal band of approximately the same width throughout. A similar but narrower band extends along the costa of the fore wing. On the hind wing the costa and outer part of area 6 is clouded with greyish white, due to a scattering of whitish scales. The female is sooty brown, with a large rounded white spot in the disc of the fore wing, and grey-blue scaling in the basal third of area 1. Beneath in both sexes, the satin white ground is only broken by the darkened fringes, and the hind marginal spot on the hind wing.

The male claspers are broad at the base, narrowing sharply to half their length, and styliform from there to the apex.

Holotype ♂, D'ENTRECASTEAUX ISLANDS : Goodenough Island, 2500–4000′, v.1913 (*A. S. Meek*), B.M. Type No. Rh. 16865.

Allotype ♀, as holotype, B.M. Type No. Rh. 16866.

Philiris ilias (Felder)
(Text-figs. 14 and 116)

Thecla ilias Felder, 1860 : 454, Amboina (Type !).
Candalides ilias (Felder) Grünberg (in Seitz), 1921 : 853 (part).

Grünberg when he gave the distribution " Amboina, Aru, Bismarck Archipelago (New Pomerania, New Lauenburg), Queensland, New South Wales," was undoubtedly dealing with a mixture of several species, his reference to variation in the whitish blue marking in the females tending to confirm this. The B.M. series comes only from the Moluccas, and it must be presumed that the range of the species does not extend beyond those islands. In this restricted sense, the females show conformity in appearance, being dingy brown, with a large metallic blue area on the fore wing, and a bluish smear basally on the hind wing. In the male the aedeagus is characterized by the long line of strong cornuti in the vesica.

Distribution, MOLUCCAS : Amboina ; Ceram ; Buru ; Saparoea ; Watubela.

Philiris subovata (Grose-Smith)
(Text-fig. 117)

Holochila subovata Grose-Smith, 1894 : 579, Humboldt Bay (Type !).
Holochila subovata Grose-Smith ; Grose-Smith, 1899, pl. (Or. Lyc.) 20, figs. 10–13.

Closely related to *P. ilias*, but the male claspers are distinctly shorter ; the cornuti within the vesica are weak, and form a compact bunch ; whereas those of *ilias* are strong and are arranged longitudinally in an extended line. The female is distinguished by the fore wing discal spot being distinctly whitish.

Distribution, NEW GUINEA : Humboldt Bay, ix–x.1892 (*W. Doherty*), 1 ♂, 1 ♀ (holotype and allotype) ; Dorey (*W. Doherty*), 7 ♂, 1 ♀ ; Dorey (*Pratt Bros.*), 1 ♂; Kapaur (*W. Doherty*), 4 ♂, 3 ♀; Arfak Mountains, Mount Siwi (*E. Mayr*), 1 ♂; Ninay Valley, xi–i.1908–9 (*A. E. Pratt*), 1 ♂ ; Fak Fak (*E. H. Pratt*), 1 ♂ ; Weyland Mountains, Dewaro Village, 3500′, vi.1920 (*Pratt Bros.*), 2 ♀ ; Aroa River (*A. S. Meek*), 2 ♂.

***Philiris oreas* sp. n.**
(Pl. 4, fig. 162. Text-fig. 118)

The length of the male fore wing is 15 mm. That sex is above very like *ilias* and *subovata*, but can be distinguished by the much wider dark margins on all wings, that of the fore wing extending to 4 mm. at the apex, and tapering to 1 mm. at the hind angle. Greyish white scaling brightens the costa on the hind wing. A further distinguishing character is furnished by an additional spot in the fuscous spotted fringe of the hind wing ; this spot is situated between those at the terminations of veins 1 and 2. The underside is like that of *ilias*.

The male claspers are short and triangular, and the vesica is without cornuti.

Holotype ♂, DUTCH NEW GUINEA : Snow Mountains, Upper Setekwa River, 2–3000′, vii.1910 (*A. S. Meek*), B.M. Type No. Rh. 16867.

Other material, NEW GUINEA : Eilanden River, xii.1910 (*A. S. Meek*), 2 ♂ ; Mount Goliath, 5000′, iii.1911 (*A. S. Meek*), 1 ♂ ; Schouten Islands, Biak, vi.1914 (*Pratt Bros.*), 1 ♂.

***Philiris kapaura* sp. n.**
(Pl. 4, fig. 157. Text-fig. 119)

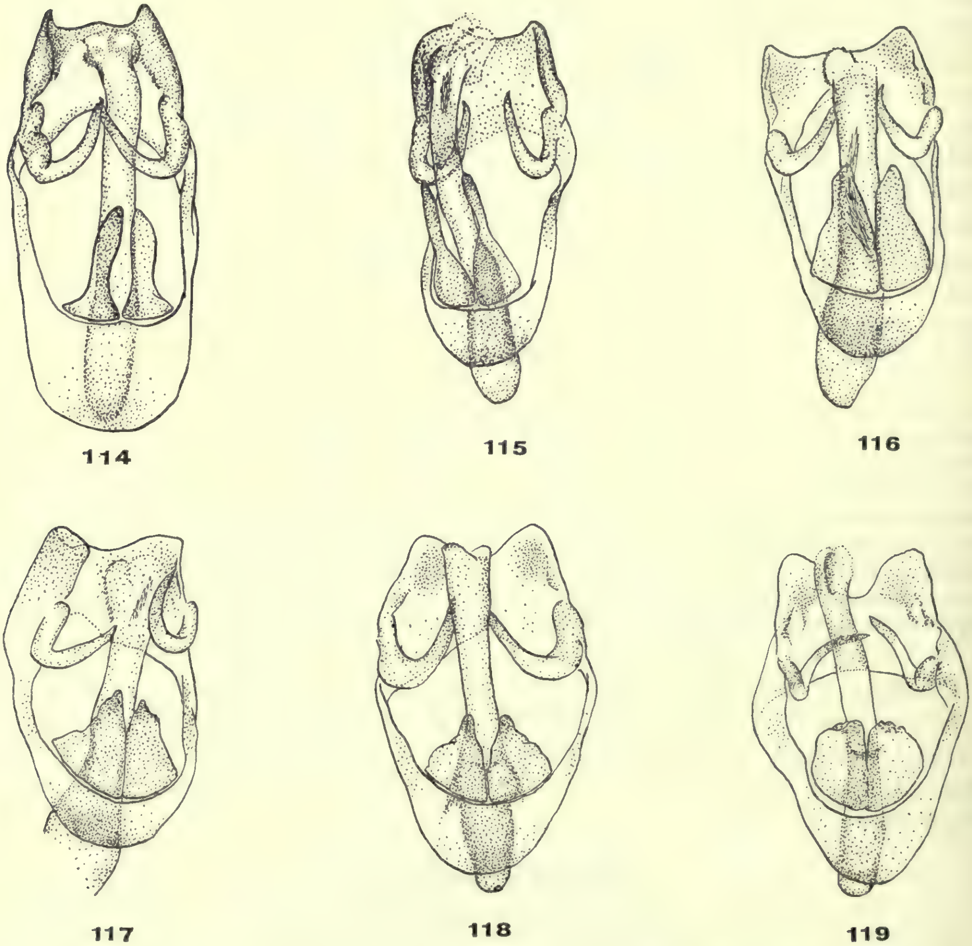
The male is above mauve-purple with a faint lustre ; the costa of the fore wing, and the distal margins of all wings are widely (1–2 mm.) brown-black, except in the apical area of the fore wing, where the black extends to a width of 5 mm. In length, the fore wing in both sexes measures from 12 to 13 mm. In the female the ground colour is dusky brown with, on the fore wing, a white central spot, and a bluish area in the base of cellule 1, as in *subovata* ; the hind wing is dusky brown with a whitish shade along the costa. Beneath, the ground is creamy white, with a faint brownish tone, quite unlike the more definite white of *ilias*.

The male claspers are short and triangular ; the vesica is without cornuti.

Holotype ♂, DUTCH NEW GUINEA : Kapaur, 1897 (*W. Doherty*), B.M. Type No. Rh. 16868.

Allotype ♀, as holotype, 1896, B.M. Type No. Rh. 16869.

Other material, DUTCH NEW GUINEA : Kapaur (*W. Doherty*), 2 ♂, 2 ♀ ; Arfak Mountains, Mount Siwi, v.1928 (*E. Mayr*), 1 ♂, 1 ♀.



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FIGS. 114–119. ♂ genital armature : 114, *Philiris albihumerata* ; 115, *P. satis* ; 116, *P. ilias* ; 117, *P. subovata* ; 118, *P. oreas* ; 119, *P. kapaura*.

The species listed below were included in Candalides by Grünberg (in Seitz) and by some subsequent authors. All possess hairy eyes, and their male genitalia exhibit a simple uncus without subuncal hooks, whereas the *Candalides* group have smooth eyes and well developed subunci. *Holochila blackburni* Tuely has already been removed to the genus *Vaga* Zimmerman ; the others cannot be retained in the group, and the following assignment is suggested :

Vaga blackburni (Tuely)

Holochila blackburni Tuely, 1878 : 9, Sandwich Islands.
Vaga blackburni (Tuely) Zimmerman, 1958 : 491.

Celastrina owgarra (Bethune-Baker) **comb. n.**

Holochila owgarra Bethune-Baker, 1906 : 100, Owgarra (Type !).
Parelodina mima Joicey & Talbot, 1916 : 81, Wandammen Mountains (Type !), **syn. n.**

Celastrina meeki (Bethune-Baker) **comb. n.**

(i) ***C. meeki meeki*** (Bethune-Baker)

Candalides meeki Bethune-Baker, 1906 : 101, Owgarra (Type !).

(ii) ***C. meeki arfaki*** (Bethune-Baker) **comb. n.**

Candalides arfaki Bethune-Baker, 1909 : 184, North New Guinea (Type !).

(iii) ***C. meeki kunupiensis*** (Wind & Clench) **comb. n.**

Candalides meeki kunupiensis Wind & Clench, 1947 : 3, Weyland Mountains.

Genus? ***zita*** Grose-Smith

Holochila zita Grose-Smith, 1895 : 511, Tenimber (Type !).

Since the only four known specimens of this species are females, it is deemed inadvisable to place them in any known genus at present. Their hairy eyes, and the formation of vein 12 of the fore wing which anastomoses with vein 11 for a short distance, preclude their inclusion in the *Candalides* group of genera.

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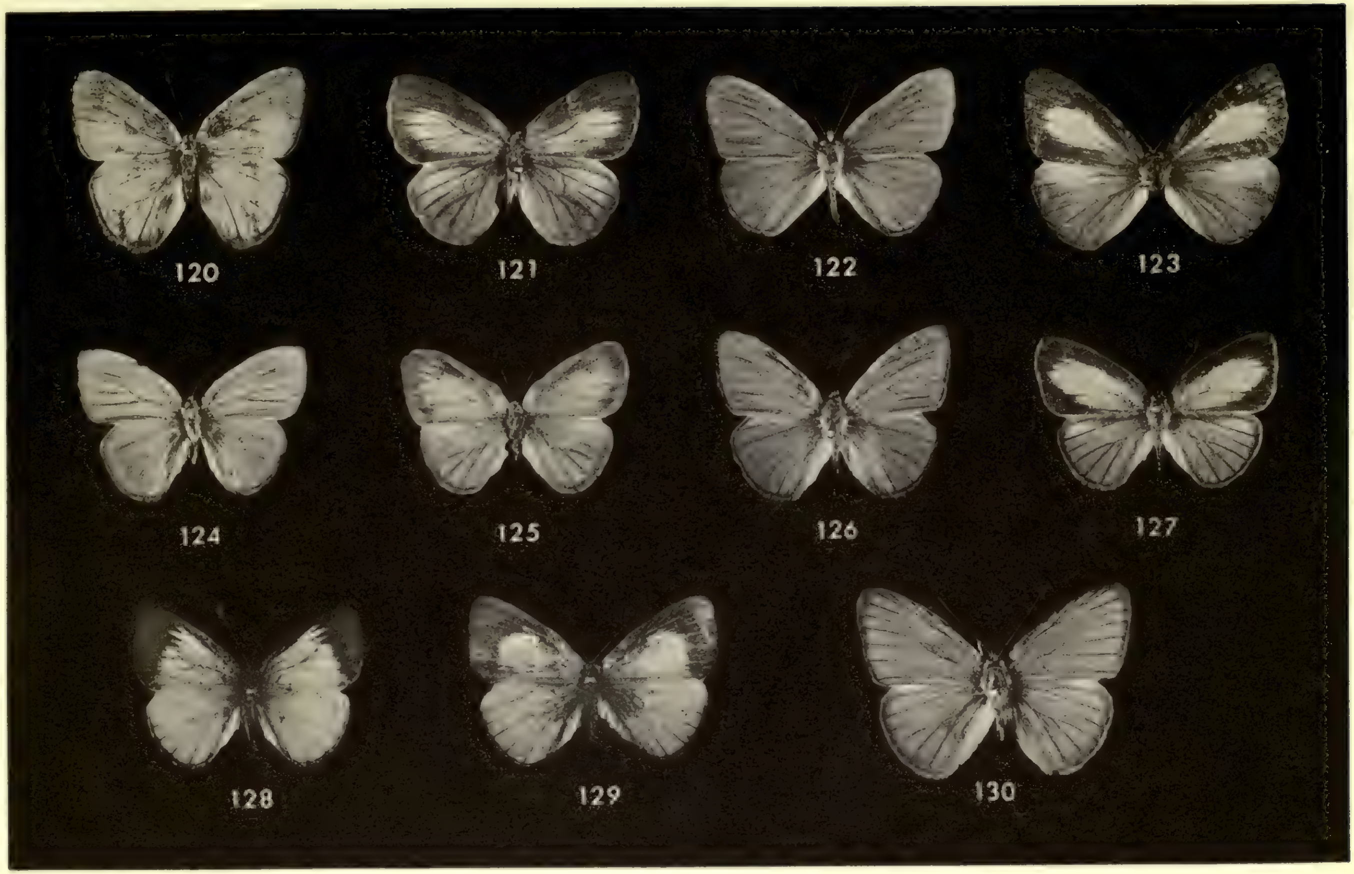
PLATE 1

(Uppersides)

FIG. 120. *Holochila biaka*, ♂, B.M. (N.H.) Neg. No. 32342.
FIG. 121. *H. biaka*, ♀, B.M. (N.H.) Neg. No. 32342.
FIG. 122. *H. ardosiacea*, ♂, B.M. (N.H.) Neg. No. 32344.
FIG. 123. *H. ardosiacea*, ♀, B.M. (N.H.) Neg. No. 32344.
FIG. 124. *H. meforensis*, ♂, B.M. (N.H.) Neg. No. 32346.
FIG. 125. *H. meforensis*, ♀, B.M. (N.H.) Neg. No. 32348.
FIG. 126. *H. riuensis*, ♂, B.M. (N.H.) Neg. No. 32348.
FIG. 127. *H. riuensis*, ♀, B.M. (N.H.) Neg. No. 32350.
FIG. 128. *H. viriditincta*, ♂, B.M. (N.H.) Neg. No. 32352.
FIG. 129. *H. viriditincta*, ♀, B.M. (N.H.) Neg. No. 32354.
FIG. 130. *H. limbata*, ♂, B.M. (N.H.) Neg. No. 32346.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A Revision of the Genus *Candalides* TITE

PLATE 2

(Undersides)

Fig. 131. *Holochila biaka*, ♂, B.M. (N.H.) Neg. No. 32343.
Fig. 132. *H. biaka*, ♀, B.M. (N.H.) Neg. No. 32343.
Fig. 133. *H. ardosiacea*, ♂, B.M. (N.H.) Neg. No. 32345.
Fig. 134. *H. ardosiacea*, ♀, B.M. (N.H.) Neg. No. 32345.
Fig. 135. *H. meforensis*, ♂, B.M. (N.H.) Neg. No. 32347.
Fig. 136. *H. meforensis*, ♀, B.M. (N.H.) Neg. No. 32349.
Fig. 137. *H. riuensis*, ♂, B.M. (N.H.) Neg. No. 32349.
Fig. 138. *H. riuensis*, ♀, B.M. (N.H.) Neg. No. 32351.
Fig. 139. *H. viriditincta*, ♂, B.M. (N.H.) Neg. No. 32353.
Fig. 140. *H. viriditincta*, ♀, B.M. (N.H.) Neg. No. 32355.
Fig. 141. *H. limbata*, ♂, B.M. (N.H.) Neg. No. 32347.

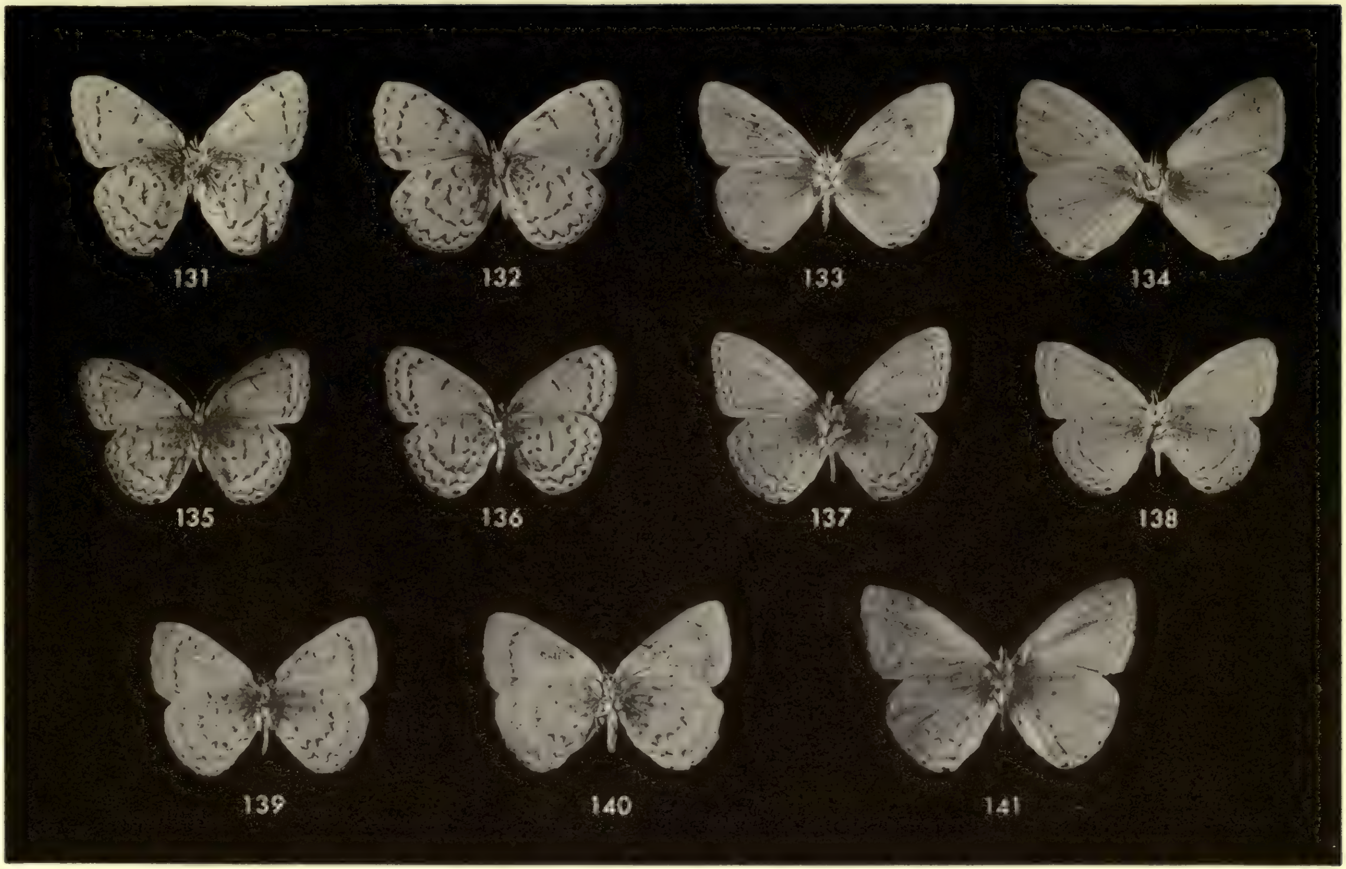
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PLATE 3

(Uppersides)

Fig. 142. *Philiris sublutea extensa*, ♂, B.M. (N.H.) Neg. No. 33757.
Fig. 143. *P. sublutea sublutea*, ♀, B.M. (N.H.) Neg. No. 33758.
Fig. 144. *P. apicalis*, ♂, B.M. (N.H.) Neg. No. 33761.
Fig. 145. *P. ianthina*, ♂, B.M. (N.H.) Neg. No. 33762.
Fig. 146. *P. philotoides*, ♂, B.M. (N.H.) Neg. No. 33760.
Fig. 147. *P. argenteus*, ♂, B.M. (N.H.) Neg. No. 33767.
Fig. 148. *P. elegans*, ♂, B.M. (N.H.) Neg. No. 33764.
Fig. 149. *P. lavendula*, ♂, B.M. (N.H.) Neg. No. 33765.
Fig. 150. *P. praeclara*, ♂, B.M. (N.H.) Neg. No. 33766.
Fig. 151. *P. montigena*, ♂, B.M. (N.H.) Neg. No. 33763.

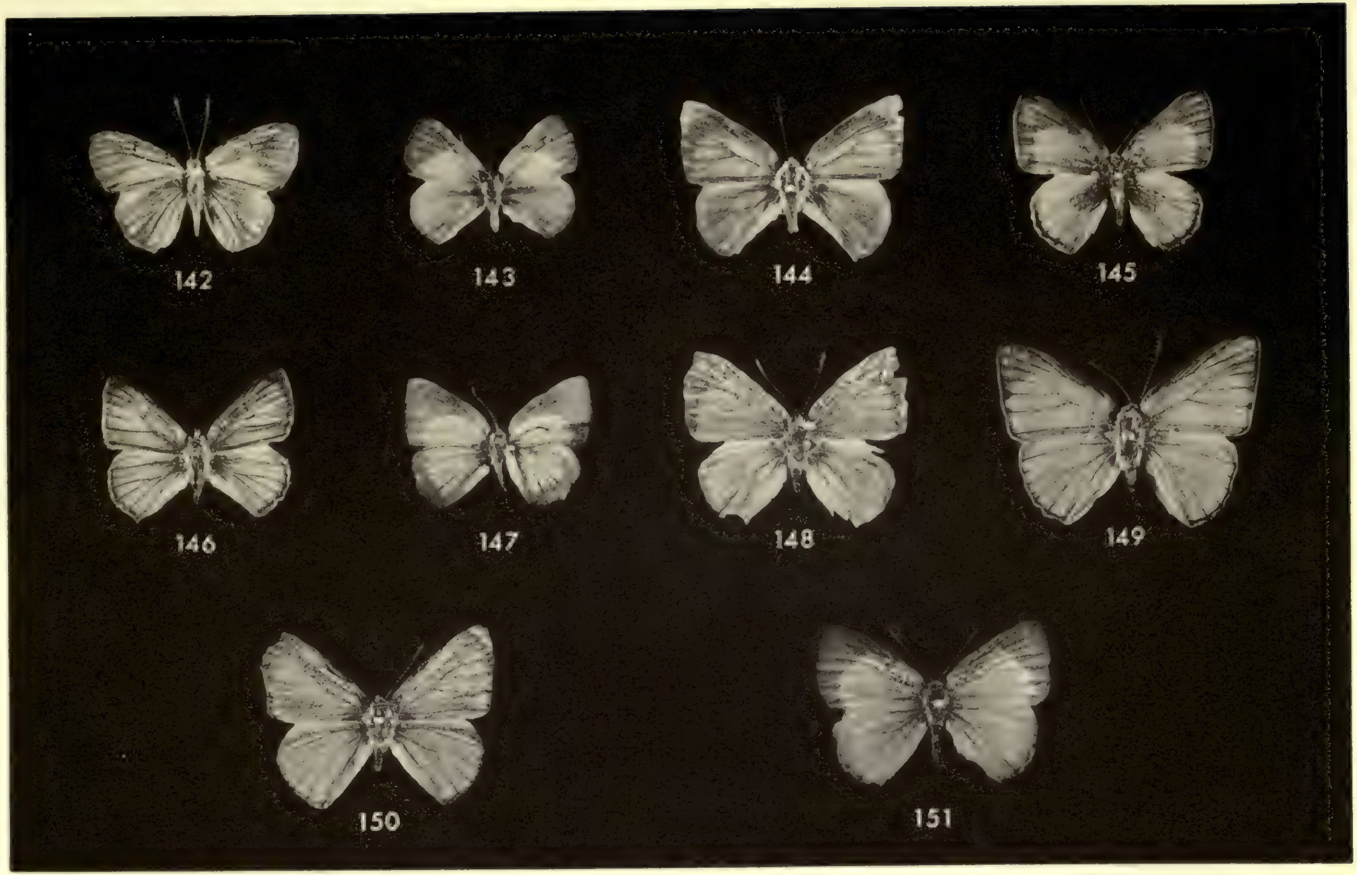
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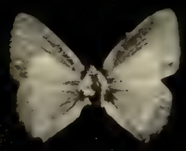
PLATE 4

(Uppersides)

FIG. 152. *Philiris kumusiensis*, ♂, B.M. (N.H.) Neg. No. 33768.
FIG. 153. *P. remissa*, ♂, B.M. (N.H.) Neg. No. 33769.
FIG. 154. *P. melanacra*, ♂, B.M. (N.H.) Neg. No. 33772.
FIG. 156. *P. lucescens*, ♂, B.M. (N.H.) Neg. No. 33771.
FIG. 157. *P. kapaura*, ♂, B.M. (N.H.) Neg. No. 33779.
FIG. 158. *P. satis*, ♂, B.M. (N.H.) Neg. No. 33777.
FIG. 159. *P. albicostalis*, ♂, B.M. (N.H.) Neg. No. 33776.
FIG. 160. *P. phengotes*, ♂, B.M. (N.H.) Neg. No. 33773.
FIG. 161. *P. albihumerata*, ♂, B.M. (N.H.) Neg. No. 33779.
FIG. 162. *P. oreas*, ♂, B.M. (N.H.) Neg. No. 33778.
FIG. 163. *P. riuensis*, ♂, B.M. (N.H.) Neg. No. 33774.
FIG. 164. *P. philotas*, ♂, B.M. (N.H.) Neg. No. 33759.
FIG. 165. *P. tombara*, ♂, B.M. (N.H.) Neg. No. 33770.
FIG. 166. *P. goliathensis*, ♂, B.M. (N.H.) Neg. No. 33775.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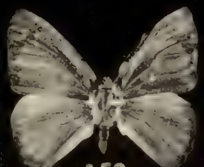
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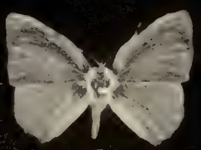
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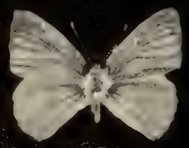
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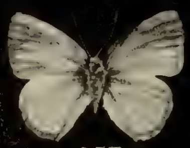
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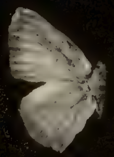
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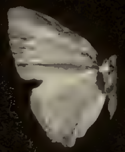
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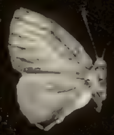
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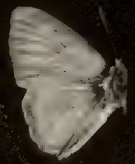
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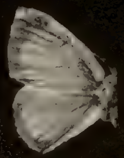
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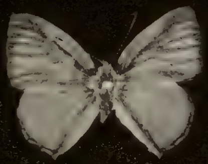
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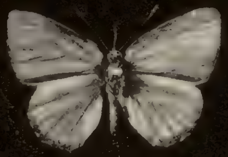
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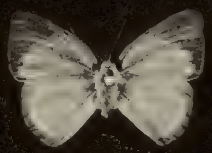
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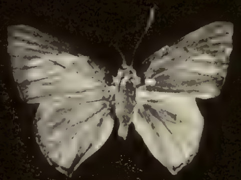
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A Revision of the Genus *Candalides* TITE

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5BM.E.

ON THE LEPTOCERINAE OF THE INDIAN SUB-CONTINENT AND NORTH EAST BURMA (TRICHOPTERA)

D. E. KIMMINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 14 No. 6
LONDON: 1963

ON THE LEPTOCERINAE OF THE INDIAN SUB-CONTINENT AND NORTH EAST BURMA (TRICHOPTERA)

BRITISH MUSEUM
3 JAN [illegible]
NATURAL HISTORY

BY

D. E. KIMMINS
British Museum (Natural History)

Pp. 261–316 ; 164 Text-figures

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THE TRUSTEES OF THE BRITISH MUSEUM (NATURAL HISTORY)

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ON THE LEPTOCERINAE OF THE INDIAN SUB-CONTINENT AND NORTH EAST BURMA (TRICHOPTERA)

By D. E. KIMMINS

SYNOPSIS

Two genera and thirty species are described as new, as a result of study of British Museum (Nat. Hist.) accessions, largely Assam material from the McLachlan collection, and material from N.E. Burma, on loan from the Naturhistoriska Riksmuseum, Stockholm. Accessions from other parts of the sub-continent have also been studied, and figures of male genitalia from paratype specimens of Ceylonese species described by Hagen are given. The genus *Oecetodella* Ulmer has been placed as a synonym of the genus *Oecetis* McLachlan.

THIS paper forms the tenth part of a series continuing the work begun by Mosely in 1933, under the title " Indian Caddis Flies ", dealing with the regions covered by the " Fauna of British India ". Since the commencement of my series of papers, Dr. F. Schmid, of Lausanne, has made extensive collections in Ceylon and the Himalayan areas of India and Pakistan, and his papers have added much to our knowledge of the fauna of these regions. The present paper is evidence, however, that much still remains to be done.

The author wishes to express his thanks to the authorities of the Naturhistoriska Riksmuseum, Stockholm, for their patience concerning the long-standing loan of the material collected by Dr. R. Malaise in N. E. Burma in 1934.

In recording the location of material studied, the abbreviations " STOCKHOLM " and " BMNH " are used for the Naturhistoriska Riksmuseum and the British Museum (Natural History) respectively.

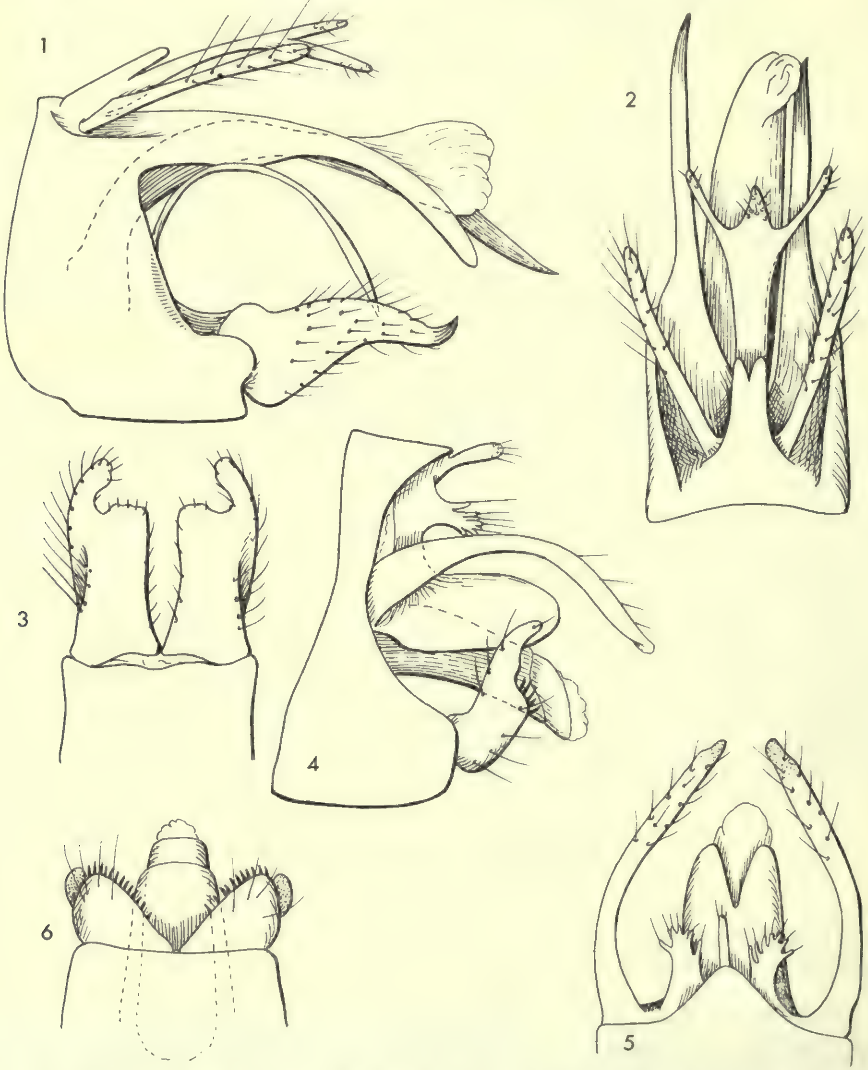
Triaenodes cloe (Hagen)

(Text-figs. 1–3)

Setodes cloe Hagen, 1859 : 210.
Triaenodes cloe (Hagen) Schmid, 1958 : 138.

The paratype of this species examined by Schmid unfortunately lacked its abdomen, and he was thus able to do no more than assign it to the genus *Triaenodes*. In the British Museum (Nat. Hist.), there is a male paratype of *Setodes cloe* Hagen, which is also a *Triaenodes*. I therefore give a description and figures of the male genitalia.

♂ Genitalia. Ninth segment moderately long, narrowed dorsally. Tenth tergite fused to ninth, the median lobe elongate, dilating slightly to a trilobed apex, the centre lobe triangular in dorsal view, the two lateral branches slightly longer, divergent and slender. Lateral lobes of tenth tergite appearing as long, downcurved, spiniform processes of the lateral margins of the ninth segment, slightly unequal in length. Aedeagus long, slender, membranous apically. Clasper in side view tapering sinuously to an acute apex, in ventral view elongate-rectangular, with the outer apical angle produced and incurved. From the base of each clasper arises a slender spine, arching upwards and then downwards. In the paratype these spines are asymmetric, the right-hand one being abbreviated.



Figs. 1–6. *Triaenodes* spp. 1–3, *T. cloe* (Hagen), Genitalia of ♂ paratype. 1, lateral; 2, dorsal (claspers omitted); 3, claspers, ventral; 4–6. *T. longicerca* sp. n. ♂ genitalia. 4, lateral; 5, dorsal (claspers omitted); 6, claspers and aedeagus, ventral.

Paratype ♂, CEYLON : Nietner. *Setodes cloe* Hagen. (M. C. Z.) Type No. 10987. In exchange from Dr. N. Banks. B.M.1931–280. *Triaenodes cloe* (Hagen), ♂ Paratype, det. D. E. Kimmins, 1962.

T. cloe (Hagen) is clearly related to *T. lankarama* Schmid, but differs in the shape of the claspers, both ventrally and laterally.

Triaenodes longicerca **sp. n.**

(Text-figs. 4–6)

♂. Insect a uniform brownish colour, due probably to long immersion in alcohol. Wings with fuscous pubescence, fore wings with margin denuded, hind wings with a fuscous fringe along the posterior margin. From the anal lobe of the hind wing arises a pencil of silky, fuscous hairs, nearly half as long as the hind wing. In the fore wing, the stem of *M* is complete.

♂ GENITALIA. Ninth segment moderately long ventrally, lateral margin widely excised, dorsal margin triangularly produced at its centre. Tenth tergite about half as deep as ninth segment, dorsally with a short, median finger, with below it, on either side, a palmate lobe, fringed with setae. The lower part of the tenth tergite forms a hood over the aedeagus, about three-quarters as long as the latter and with an acute, median excision of its apex. Cerci pigmented, long and slender, arched inwards and downwards. Aedeagus slender, enclosed within a sleeve or trough with a rounded, ventral apical margin. Clasper directed upwards, in side view tapering from about midway to form a digitate process. In ventral view, the base of the clasper is broadly triangular, its inner surface heavily armed with stout setae.

♀ Unknown.

Length of fore wing, ♂, 6·5 mm.

Holotype ♂ (mounted as microscope preparations), N. E. BURMA : Kambaiti, 6,700 ft., 12.vii.1934 (*R. Malaise*), STOCKHOLM.

This species should be easily recognisable by its long, curved cerci and by the long pencil of hairs arising from the anal lobe of the male hind wing.

Triaenodes interna McLachlan.

PAKISTAN : Peshawar District, Taru, v.1915, 4 ♂, 3 ♀ (*T. B. Fletcher*), BMNH.

KASHMIR : Srinagar, viii–ix.1923, 2 ♂ (*T. B. Fletcher*), iv.1932, 1 ♂ (*Yale N. India Exped.*), Gagirbal, iv.1932, 1 ♂ (*Yale N. India Exped.*), BMNH.

These specimens belong to the variety *capitata* Martynov.

Previously recorded distribution : PALESTINE to TURKESTAN.

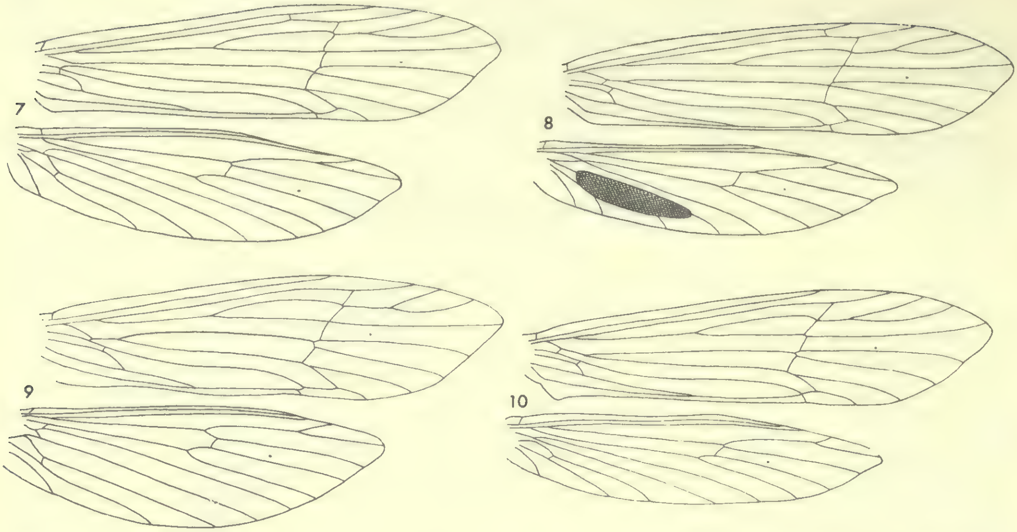
Triaenodes sp.

N. E. BURMA : Kambaiti, 7,000 ft., 30.iv.1934, 4 ♀ (*R. Malaise*), STOCKHOLM. In the absence of associated males, these females are left undetermined.

Adicella biramosa Martynov

Adicella biramosa Martynov ; Schmid, 1958 : 133, pl. 24, figs. 12–15.
Adicella syriaca Ulmer ; Ulmer, 1915 : 74 (Ceylon).

Examination of the female from CEYLON (Peradeniya, ii.1911, *J. C. F. Fryer*), BMNH, determined as *A. syriaca* by Ulmer, justifies Schmid's doubts. It agrees very well with Schmid's figure of the female genitalia of *Adicella biramosa* Martynov.



FIGS. 7–10. *Adicella* spp., ♂ wings. 7, *maculata* sp. n.; 8, *najas* (Hagen), paratype; 9, *castanea* sp. n.; 10, *bifasciata* sp. n.

Adicella maculata sp. n.

(Text-figs. 7, 11–16)

Head fulvous, with yellowish pubescence. Antennae about two and a half times as long as fore wing, creamy white, with faint blackish annulations. Palpi with fulvous pubescence. Thorax fulvous, legs luteous. Fore wing densely clothed with pale golden pubescence, ornamented with spots and streaks of brown pubescence, the streaks forming a V about midway, its point directed apically. The brown pubescence borders the costa and at the apical margin encloses six pale yellow spots. Hind wing with sparse, fuscous pubescence. Venation much as in *A. reducta*, but in fore wing the discoidal cell is shorter and fork R_2 is longer than its footstalk. Apices of wings more pointed and hind wing is relatively broader.

♂ GENITALIA. Tenth segment fused to ninth, trilobed, the median lobe slender, digitate, shorter than the side lobes, which form a deep hood with an excised apex, the apices of the side lobes in side view rounded. Cerci short, ovate in side view, more strongly dilated on their inner sides in dorsal view. Aedeagus cylindrical, curved downwards and terminating in a bifid, membranous apex. Clasper from side with upper and lower margins slightly divergent, base constricted, concave on inner surface, upper apical angle produced in a flattened lobe, which is rounded in ventral view, digitate from side. Lower apical angle curved inwards to form a rounded hook.

♀ GENITALIA. Ninth segment moderately short, its apical dorsal margin produced in a short, bifid process. Ventral margin lightly sclerotized, somewhat obscure. Cerci short, stout, triangular in side view, broadly rounded in dorsal aspect. Lateral gonapophyses small, shorter than cerci, apical margin widely excavate in side view. Tenth segment forming a short, transparent hood, only slightly exceeding the cerci.

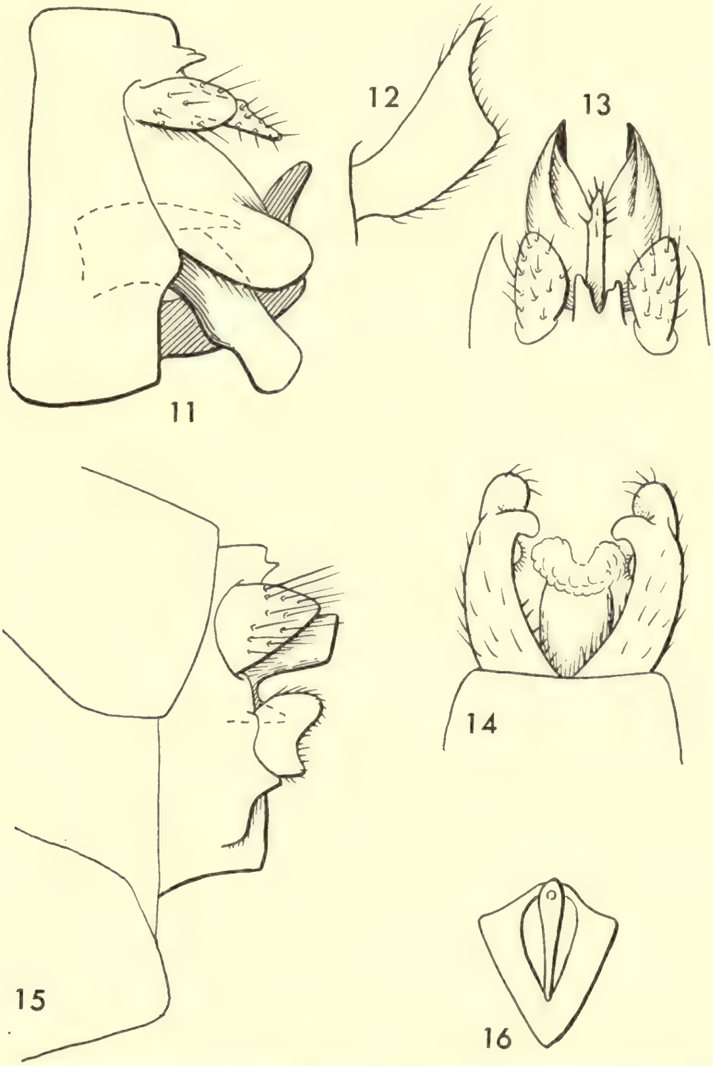
Length of fore wing, ♂, ♀, 5–7 mm.

Holotype ♂ (mounted as microscope preparations), INDIA: Assam, Khasi Hills (*McLachlan collection*), BMNH.

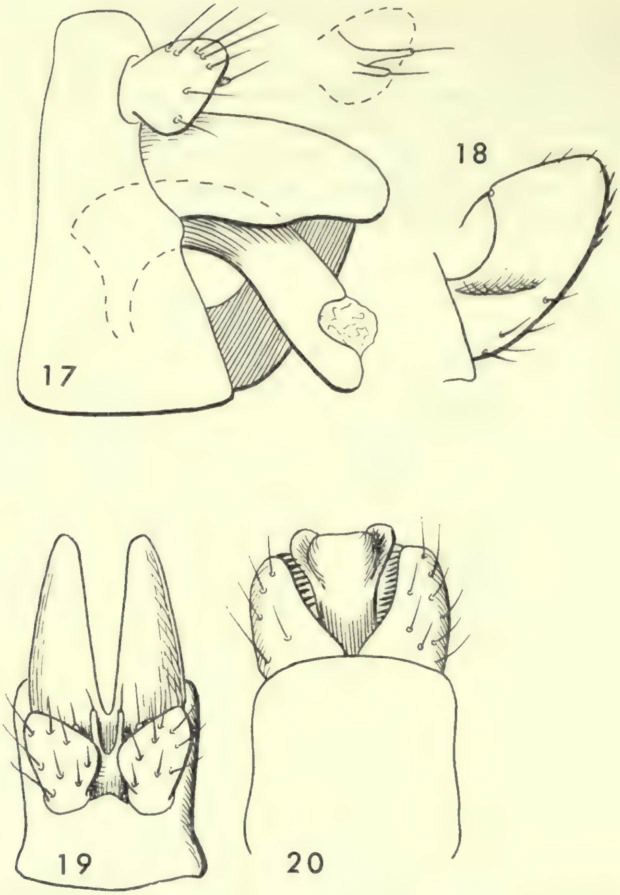
Allotype ♀ (pinned, abdomen in glycerine), same data as holotype, BMNH.

Paratypes (pinned), same data as holotype, 8 ♂, 4 ♀ ; Assam, Cherrapunji, 12 ♂, 4 ♀ (*native collector*), BMNH.

This species is perhaps closest in both sexes to *A. agastya* Schmid, from Ceylon, from which it differs in the male in the narrower cerci and in the claspers, which are more incurved in ventral view and are divided at the apex into upper and lower incurved lobes. In the female, the cerci are blunter. The females associated with the males show a greater variation in wing markings.



FIGS. 11–16. *Adicella maculata* sp. n., genitalia. 11, ♂ lateral ; 12, ♂ left clasper, lateral ; 13, ♂ ninth and tenth tergites, dorsal ; 14, ♂ claspers and aedeagus, ventral ; 15, ♀ lateral ; 16, ♀ vaginal structure, ventral.



Figs. 17–20. *Adicella najas* (Hagen) ♂ paratype, genitalia. 17, lateral, with inset of median lobe of tenth tergite; 18, left clasper, lateral; 19, ninth and tenth tergites, dorsal; 20, claspers and aedeagus, ventral.

Adicella najas (Hagen)

(Text-figs. 8, 17–20)

Setodes najas Hagen, 1859 : 210.
Adicella najas (Hagen) Schmid, 1958 : 135, pl. 25, fig. 6 (♀ genitalia of paratype).

Schmid (1958) gives a brief description of a female paratype from the Hagen collection at Harvard and figures the genitalia. In the British Museum (Nat. Hist.) are two more paratypes of *Setodes najas* Hagen, received in exchange from Dr. N. Banks. Both are males and one is certainly an *Adicella*, with a patch of androconia in the hind wing as in *A. ino* (Hagen), but with genitalia distinct from that species. The other paratype is definitely not an *Adicella*, and is made the type of a new genus and species later in this paper.

This discovery rather confuses the position as to the identity of *S. najas* Hagen, a question which can only be resolved by a study of the remainder of the type series in Harvard and by the designation of a lectotype, if this has not already been done. In the meantime, one can only hope that the ♂ *Adicella* in the British Museum is conspecific with the female studied by Dr. Schmid and accept it as the male of *Adicella najas* (Hagen). The colour and markings of the fore wing agree reasonably with Schmid's brief description of the female of *najas*. The venation of the hind wing agrees with Schmid's figure of *A. ino*, but the patch of androconia is brown, not black.

♂ GENITALIA. Cerci short and broad, somewhat triangular. Median lobe of tenth tergite not exceeding the cerci, consisting of a pair of bifid fingers, inner branch the longer. Lateral lobes moderately long and spatulate in side view, convex exteriorly, tapering to rounded apices from above. Aedeagus cylindrical, down-curved, its upper apical angle excised in side view, the excision filled with membrane. Lower margins of excision diverging and appearing as rounded lobes on each side of the apex in ventral view. Claspers stout, short and upcurved, apex obliquely truncate in side view. From beneath, tapering to rounded apices, inner margins thickly set with strong teeth.

This description is based upon a paratype ♂ (pinned, one pair of wings mounted between celluloid, abdomen cleared and in glycerine), (M. C. Z.) Type No. 10982. Ceylon, Nietner, Hagen. *Setodes najas* Hag. (Banks's writing). In exchange from Dr. N. Banks, B.M.1931–280.

Adicella castanea sp. n.

(Text-figs. 9, 21–23)

Head fuscous, with fuscous hairs. Antennae incomplete, but at least twice as long as fore wing, clothed with creamy white pubescence, articulations fuscous. Palpi fulvous, with fuscous pubescence. Thorax fuscous, with fuscous pubescence. Legs fulvous, with creamy pubescence. Fore wing densely clothed with castaneous pubescence, in the apical half with indefinite, yellowish areas, and with a pale, longitudinal streak about midway along the costa. Hind wing sparsely clothed with golden pubescence. In the fore wing, the discoidal cell is about as long as its footstalk, more than half as long as the thyridial cell. Fork R_2 about as long as its footstalk. The apical cross-vein linking Cu_2 and A longer than in *A. maculata*, more or less parallel to wing margin. In the hind wing, the free part of R_5 arises more than its own length beyond the fork of *Rs*.

♂ GENITALIA. Ninth segment short, apical margin dorsally produced in a rounded lobe and fused to the tenth tergite. The latter is divided into an upper median and two lateral lobes. The median lobe is short and broad, excised at its centre to form two rounded, serrate plates. From beneath these plates extend the lateral lobes, linked by membrane basally, slightly incurved, their apices rounded in side view. Cerci long, slender, incurved. Aedeagus short, nearly straight, terminating in some inflated membrane. Clasper short, in side view angled upwards near the base. From beneath broad, with rounded, spatulate apices, inner margins armed with short, strong teeth.

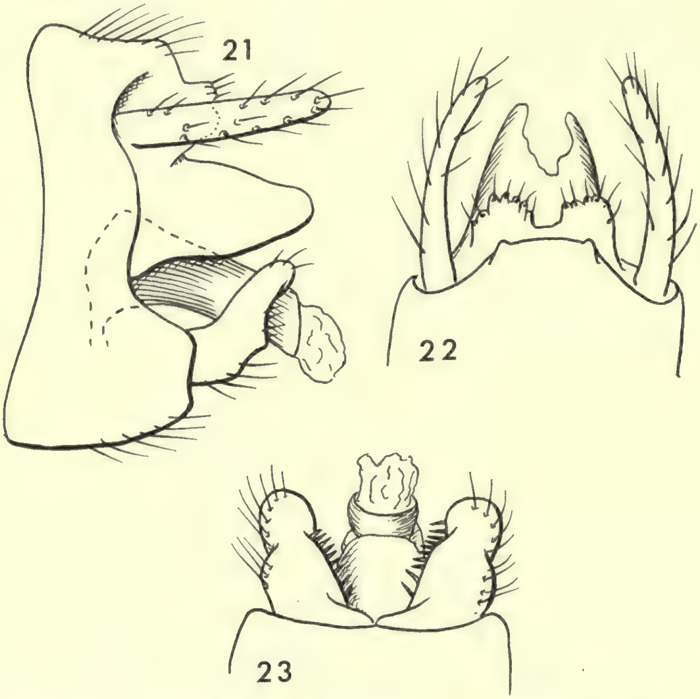
♀ Unknown.

Length of fore wing, ♂, 6 mm.

Holotype ♂ (pinned, one pair of wings and abdomen mounted as microscope preparations), INDIA : Assam, Khasi Hills (*McLachlan collection*), BMNH.

Paratype ♂ (pinned, abdomen in glycerine), Assam, Cherrapunji (*native collector*), BMNH.

This species appears to be most closely allied to *Adicella pulcherrima* Ulmer, from Java, Sumatra and New Guinea. Both have long, slender cerci and rather short, broad claspers. *A. castanea* has rather shorter and stouter cerci, and the median lobe of the tenth segment is more strongly developed. The apices of the claspers are rounded, not obliquely truncate, in ventral view.



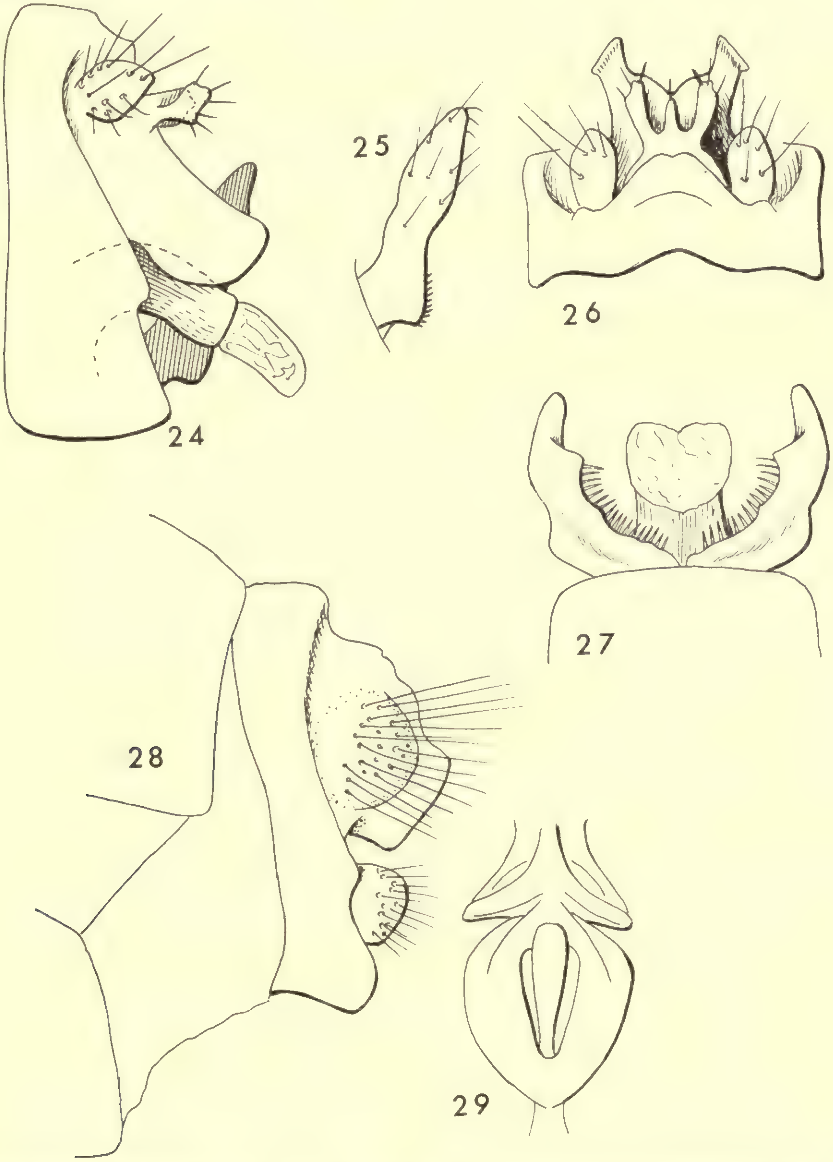
FIGS. 21–23. *Adicella castanea* sp. n. ♂ genitalia. 21, lateral ; 22, ninth and tenth tergites, dorsal ; 23, claspers and aedeagus, ventral.

Adicella trifida sp. n.

(Text-figs. 24–29)

Specimens rather rubbed. Head tawny, with golden brown hairs. Basal segments of antennae tawny, segments of basal half creamy white, apices fuscous, which colour gradually predominates towards apex of antenna. Palpi tawny, with darker pubescence. Thorax tawny, with golden brown hairs. Legs luteous. Both wings with traces of golden brown pubescence.

♂ GENITALIA. Ninth segment produced dorsally at its centre and fused to the tenth segment. Cerci short, ovate. Median lobe of tenth segment trifid, a little longer than cercus, the median branch laterally compressed, shorter than lateral branches. In side view, the lateral branches are narrow basally, expanding into irregularly clavate apices. Lateral lobes of tenth tergite fused to form a downwardly directed hood, excised at its apex in dorsal view, the arms of the excision obliquely truncate. Aedeagus short, cylindrical, arched downwards, with membrane extruded from apex. Clasper angled upwards at its base, with a triangular projection on lower margin at base in side view. From beneath, the claspers are divergent, curving inwards, inner margins fringed with stout teeth.



FIGS. 24–29. *Adicella trifida* sp. n. genitalia. 24, ♂ lateral ; 25, ♂ left clasper, lateral ; 26, ♂ ninth and tenth tergites, dorsal ; 27, ♂ claspers and aedeagus, ventral ; 28, ♀ lateral ; 29, ♀ vaginal structure, ventral.

♀ GENITALIA. Ninth tergite with lower angles produced downwards on each side, in lateral aspect appearing synscleritous, ninth sternite membranous. Lateral gonapophyses small, rounded. Tenth segment fused to ninth, cerci appearing as low convex mounds, with long setae.

Length of fore wing, ♂, 7·5 mm., ♀, 8 mm.

Holotype ♂ (mounted as microscope preparations), N. E. BURMA : Kambaiti, 2,000 metres, 12.v.1934 (*R. Malaise*), STOCKHOLM.

Allotype ♀ (pinned, with abdomen in glycerine), same data, BMNH.

In the structure of the tenth tergite, aedeagus and claspers, this species somewhat resembles *A. castanea* sp. n. In that species, however, the cerci are much longer and slender, the median lobe of the tenth tergite forms two transverse plates and the claspers are shorter.

Adicella fulva sp. n.

(Text-figs. 30–33)

The unique example is mainly fulvous in colour (possibly faded). Antennae creamy white. Maxillary palpi with fuscous pubescence. Legs pale luteous. Wings hyaline, with sparse, fuscous pubescence. Venation much as in *A. castanea*.

♂ GENITALIA. Ninth segment with the lateral margins folded inwards to form rounded lobes beneath the cerci, and supporting the basal, ventral margins of the tenth tergite. The latter is fused to the ninth segment, its median lobe divided into two short, slender fingers, terminating in pairs of setae. Lateral lobes forming a deep hood, each excised at its apex, which is rounded in lateral aspect. Cerci short and broad, ovate in dorsal and lateral aspects. Aedeagus with a short, down-curved basal sleeve, an inner portion protruding from it and terminating in a bilobed, membranous process (details of aedeagus somewhat obscure). Claspers straight in side view, slightly constricted about midway. From beneath, they are gently incurved, the inner apical surfaces armed with strong, socketed teeth.

♀ Unknown.

Length of fore wing, ♂, 5 mm.

Holotype ♂ (pinned, abdomen in glycerine), INDIA : Assam, Khasi Hills (*McLachlan collection*), BMNH.

The male genitalia bear some resemblance to those of *A. androconifera* Schmid, from Iran, but the claspers are not hooked at the apices in ventral view, the aedeagus is more complex and the lateral margins of the ninth segment are infolded.

Adicella bifasciata sp. n.

(Text-figs. 10, 34–37)

Head fuscous, with fulvous hairs. Antennae fulvous, with darker annulations. Palpi fulvous. Thorax fuscous, legs fulvous. Fore wing with dense, yellowish pubescence, marked with two narrow, transverse bands of fuscous pubescence, angled towards apex of wing at their centres, and with fuscous marginal spots in the apical cells. Hind wing with sparse, fuscous pubescence. The hind wing is definitely narrower than the fore wing.

♂ GENITALIA. Ninth segment with ventral apical margin produced in two small, triangular teeth, with a shallow excision between them. Cerci short, narrowly ovate. Tenth tergite fused to ninth segment, median lobe reduced to a pair of short, slender fingers. Lateral lobes very short, ovate from the side, incurved, with acute apices in dorsal aspect. Aedeagus with a short, slightly curved basal sleeve. Inner portion extruded in holotype, narrowly ligulate, with a clavate apex when seen from behind, narrow, with a hooked apex in side view. From its ventral surface near the base arises a membranous sac, bearing short teeth. Clasper in side view short, directed upwards and sinuous. From behind, the claspers are broader, incurved, with truncate apices armed with teeth.

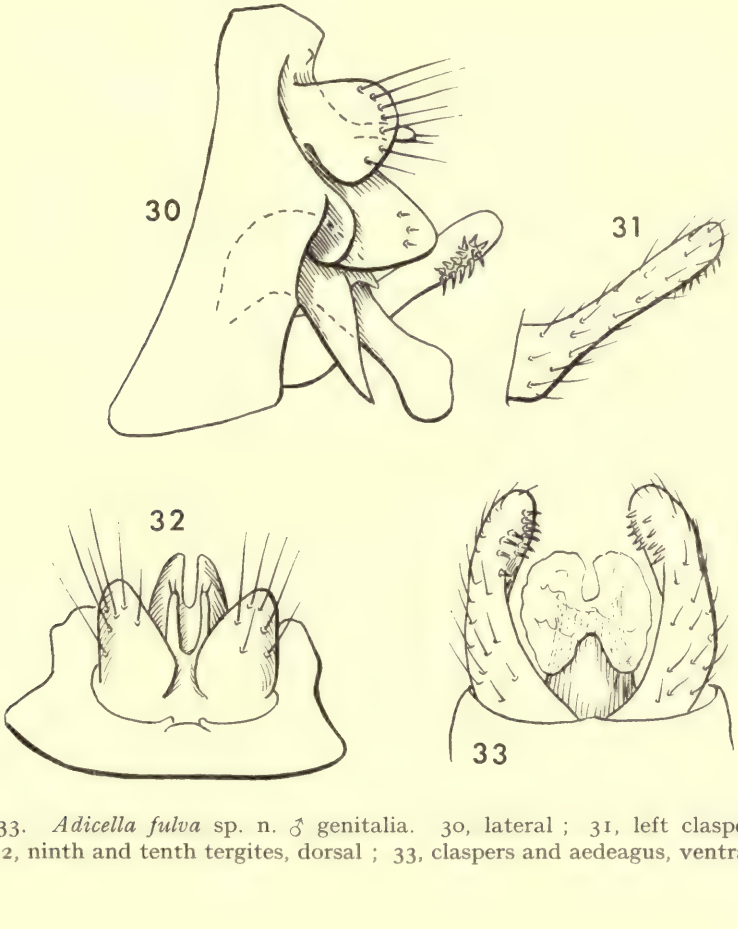
♀ Unknown.

Length of fore wing, ♂, 6 mm.

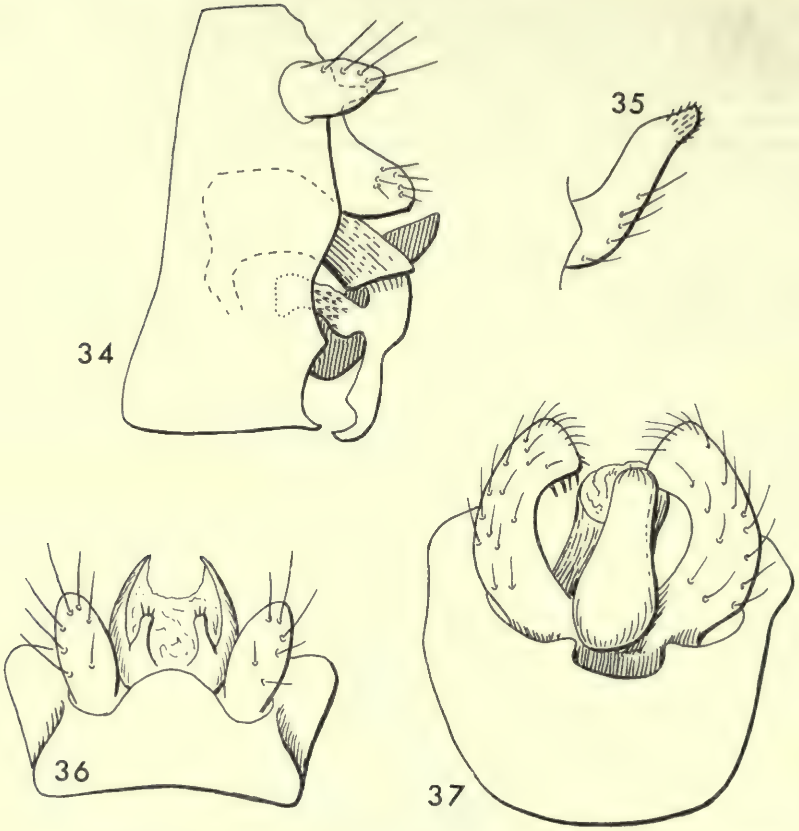
Holotype ♂ (pinned, one pair of wings mounted between celluloid, abdomen cleared and in glycerine), S. INDIA: Palnis, 7,000 ft., Kodaikanal, viii.1921 (*T. B. Fletcher*). BMNH.

Paratype ♂ (pinned), same data, BMNH.

The short lateral lobes of the tenth segment, ligulate aedeagus and form of the claspers, together with the rather narrow hind wing, should make this species easily recognisable.



FIGS. 30–33. *Adicella fulva* sp. n. ♂ genitalia. 30, lateral; 31, left clasper, lateral; 32, ninth and tenth tergites, dorsal; 33, claspers and aedeagus, ventral.



FIGS. 34–37. *Adicella bifasciata* sp. n. ♂ genitalia. 34, lateral ; 35, left clasper, lateral ; 36, ninth and tenth tergites, dorsal ; 37, ninth segment, claspers and aedeagus, ventral.

KEY TO MALES OF *Adicella* FROM THE INDIAN SUB-CONTINENT, CEYLON AND BURMA

1 Clasper in side view produced at apex in a long, slender, recurved finger . ***ino*** (Hagen)

– Clasper not as above 2

2 Clasper in side view widely bifid . . . . ***biramosa*** group 3

– Clasper in side view simple 6

3 Basal branch of clasper slender, digitate 4

– Basal branch of clasper not much narrower than main branch 2

4 Fore wing ochraceous yellow, with a few small, indistinct brown marks ***dharasena*** Schmid

– Fore wing reddish brown, margined with brownish . . . ***narendraya*** Schmid

5 Basal branch of clasper stout, obtuse at apex . . . . ***dhruvasena*** Schmid

– Basal branch of clasper tapering to an acute apex . . . ***biramosa*** Martynov

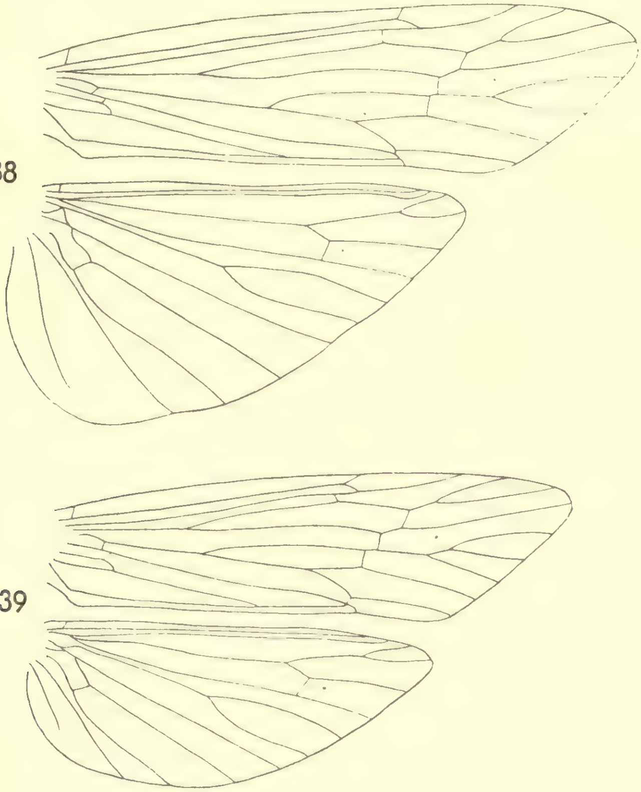
6 Clasper in side view short and stout 7

– Clasper in side view slender 9

7 Clasper in side view with upper apical angle produced in a slender finger, forming a rounded lobe in ventral view, lower apical angle also produced inwards in a rounded lobe . . . . ***maculata*** sp. n.

– Clasper in side view stout, upcurved, apex obliquely truncate 8

8 Posterior wing with an elongate area of androconia in cubito-anal area . . . **najas** (Hagen)
– Posterior wing without androconia . . . . **agastya** Schmid
9 Cerci long, slender . . . . **castanea** sp. n.
– Cerci short 10
10 Lateral lobes of tenth tergite much longer than cerci . . . . . **trifida** sp. n.
– Lateral lobes of tenth tergite only slightly longer than cerci 11
11 Cerci in side view clavate . . . . **fulva** sp. n.
– Cerci in side view ovate . . . . **bifasciata** sp. n.



FIGS. 38–39. *Athripsodina marginata* (Banks), wings. 38, ♂ ; 39, ♀.

ATHRIPSODINA gen. n.
(Text-figs. 38–39)

♂. Spurs 2, 2, 2. Antenna about twice as long as fore wing. Maxillary palpus with basal segment short, second about three times as long as first, third four-fifths as long as second, fourth slightly longer, and fifth slightly shorter, than third. Fore wing about four times as long as wide, apex acutely rounded. Discoidal cell nearly twice as long as thyridial cell, nearly three times as long as its footstalk. Forks R_2 and Cu_{1a} present, the former with a long footstalk. *M* in hind wing unforked.

♀. Antenna about one and a half times as long as fore wing. Fork M_1 present in fore wing, discoidal cell only one and a half times as long as thyridial cell. M in hind wing unforked.

Type-species, *Leptocerus marginatus* Banks, 1911.

Athripsodina is closely related to *Athripsodes* Billberg, in having fork M_1 present in the female fore wing, but differing in having M in the hind wing unforked in both sexes, as in *Ptochoecetis* Ulmer and *Parasetodes* McLachlan. In *Ptochoecetis* the media in the fore wing forks at the anastomosis and fork R_2 in the hind wing is wanting. In *Athripsodina* the media in the fore wing forks beyond the anastomosis and fork R_2 in the hind wing is present. The male genitalia of *Athripsodina marginata* (Banks) are rather of the pattern of *Athripsodes fulva*, and had it not been for the consistently unforked media in the hind wing, I should certainly have placed *marginata* Banks in the genus *Athripsodes*.

Athripsodina marginata (Banks) **comb. n.**

(Text-figs. 38–45)

Leptocerus marginatus Banks, 1911 : 105 (Bengal, Pusa).

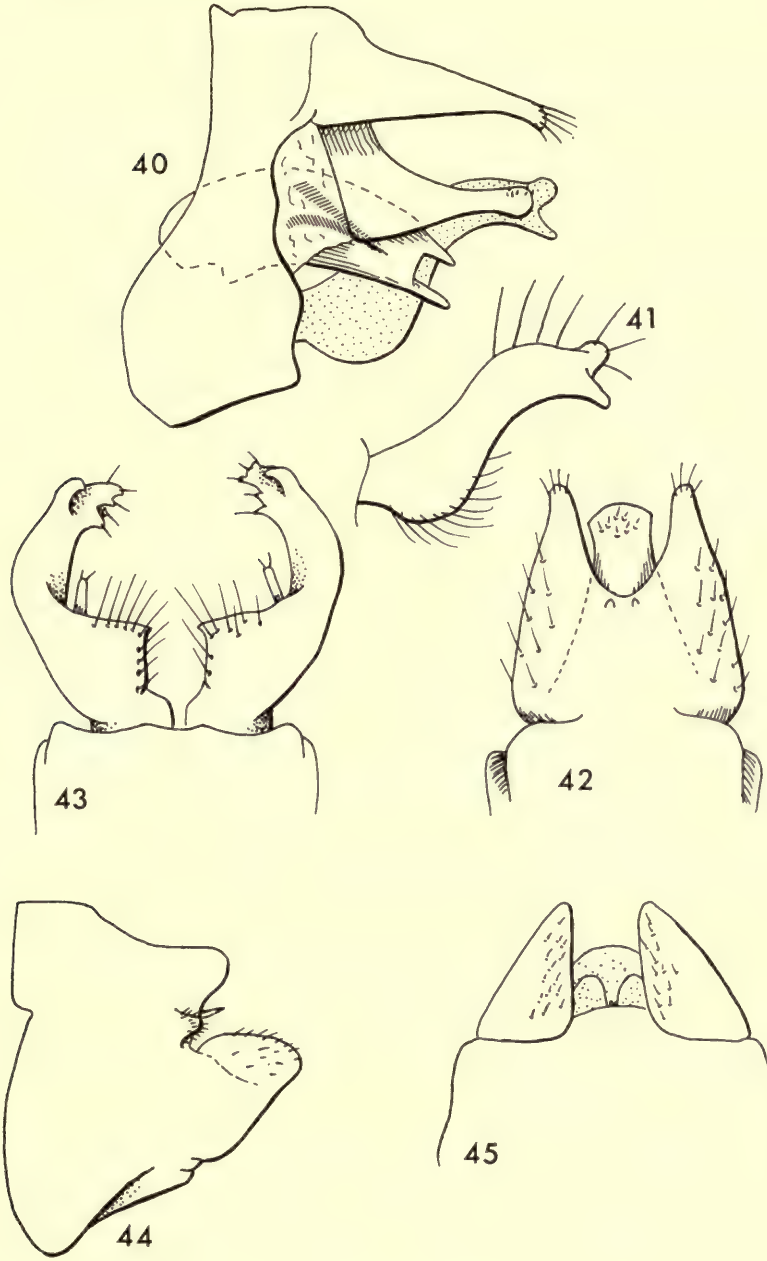
Dr. P. J. Darlington, Jr., has kindly examined the type of this species for me and has confirmed that Banks's statement that fork 3 is absent in the hind wing means that the media is unforked, and that the anal area of the fore wing is white, in contrast to the dark brown pubescence bordering it anteriorly. I am giving a full description of both sexes, based upon British Museum material.

Head warm brown, densely clothed with white pubescence above, and on frons with whitish and yellowish brown pubescence. Basal segments of antennae with whitish pubescence, remaining segments whitish basally, apices brownish, the brownish increasing in length towards apex of antenna. Maxillary palpi pale fuscous, with dense, paler pubescence, segments four and five flexible. Thorax brownish, with white pubescence dorsally, sides pale yellowish brown. Legs pale fuscous, with short, whitish pubescence. Abdomen brownish. Fore wing clothed with dense, short pubescence, anteriorly brownish mixed with greyish, the brownish gradually predominating posteriorly to give a rich brown band in the intercubital area. Beyond Cu_2 there is an abrupt change to white pubescence, which extends to the anal margin. The main veins in the area anterior to Cu_2 are marked with alternating brown and grey streaks, the latter the longer. Hind wing hyaline, with very sparse pubescence.

♂ Genitalia. Cerci fused with ninth segment to form a broad hood, its apical margin with a deep, U-shaped excision. Tenth tergite sub-triangular in dorsal view, its apex slightly dilated and convex. In side view, it is deep basally, tapering to a slender, slightly clavate apex. Aedeagus short and stout, upper and lower apical margins produced in slender fingers. Within the aedeagus are two short spines. The clasper in side view is curved sinuously upward and then caudad, terminating in a bifid apex. From beneath, the claspers form a pair of calipers, each with a wide, triangular projection on the inner, basal margin, and with a slender, digitate process about midway, directed caudad. Lower apical process short and curved, upper larger and irregularly dentate.

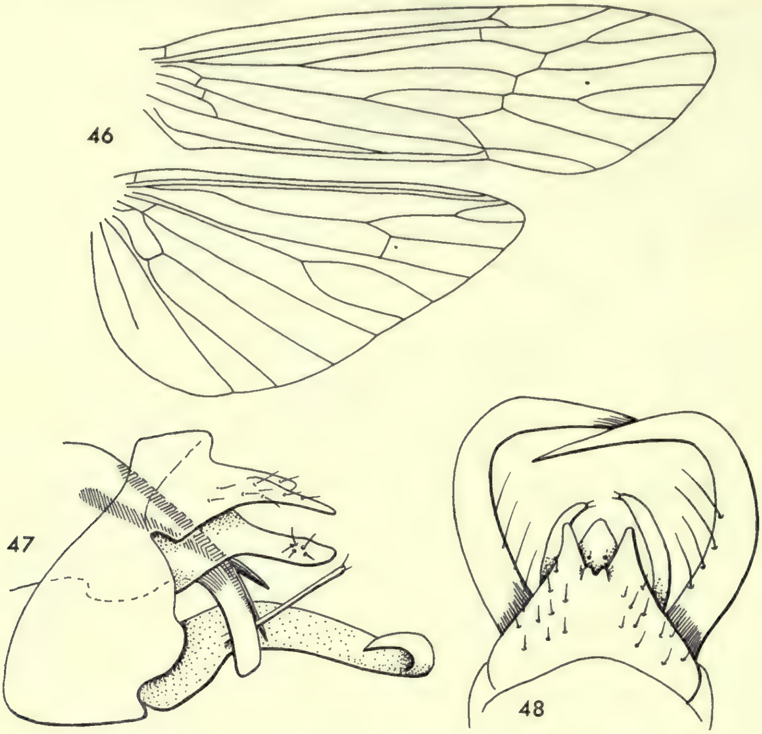
♀ Genitalia. Ninth and tenth segments fused, dorsal apical margin of the tenth projecting as a rounded knob with, beneath it, a thin, transverse, bilobed plate. Lateral gonapophyses ovate in side view, triangular from beneath.

Length of fore wing, ♂, 8–11 mm., ♀, 6·10 mm.



FIGS. 40–45. *Athripsodina marginata* (Banks), genitalia. 40, ♂ lateral ; 41, ♂ left clasper, lateral ; 42, ♂ ninth and tenth tergites, dorsal ; 43, ♂ claspers, ventral ; 44, ♀ lateral ; 45, ♀ ventral.

The material examined is from Pusa, Bihar (the type locality) and consists of 5 ♂, 9 ♀, taken in the months February to April, August to October and December, during the years 1910–1916. The examples taken August–October are noticeably smaller than those taken in other months.



Figs. 46–48. *Athripsodina martynovi* (Forsslund) var. 46, ♂ wings; 47, ♂ genitalia, lateral; 48, ♂ genitalia, dorsal.

Athripsodina martynovi (Forsslund) **comb. n.**
(Text-figs. 46–48)

Leptocerus forcipatus Martynov, 1936 : 253 (*nec* Forsslund, 1935).
Leptocerus martynovi Forsslund, 1940 : 48.

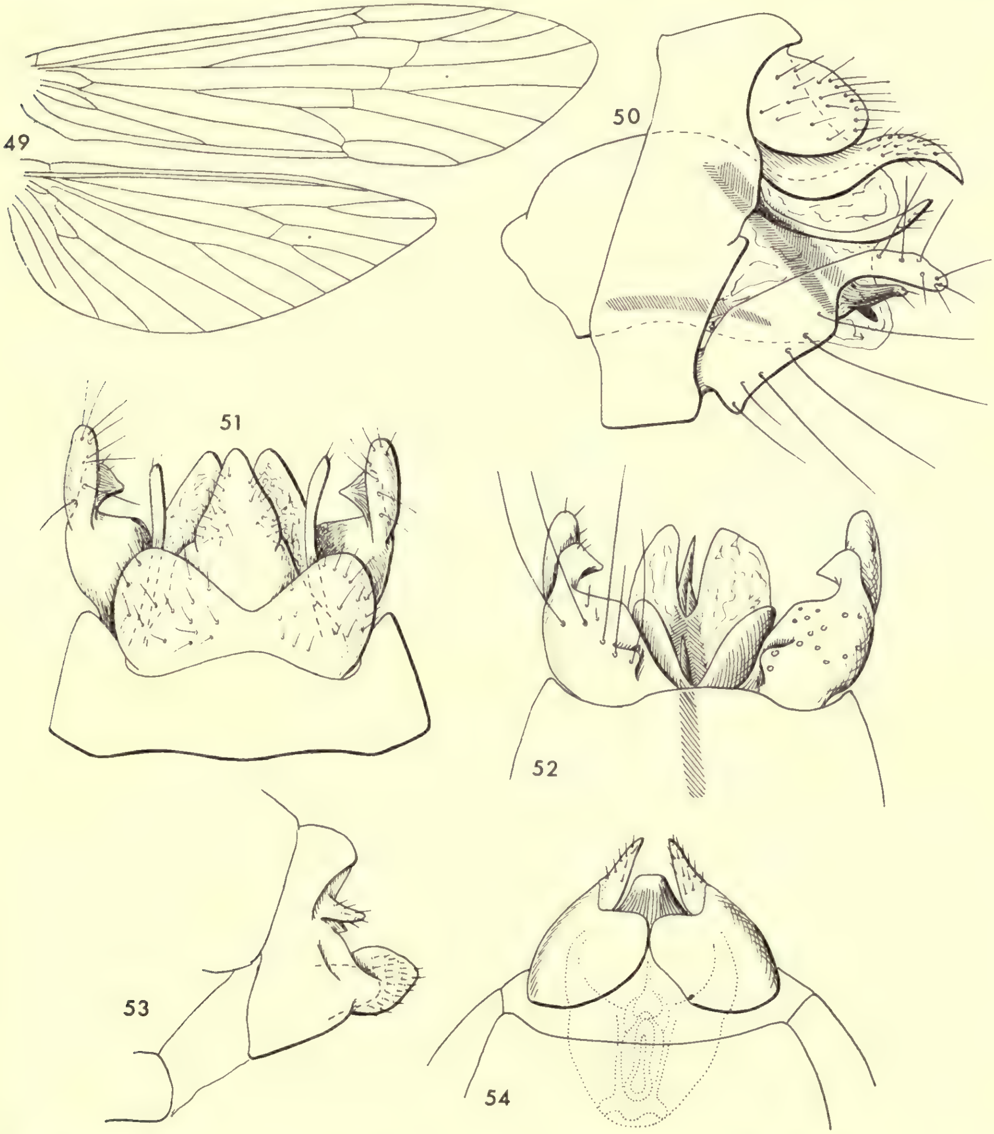
Ceylon : Bintenne, x.1928. 1 ♂.

The single specimen has genitalia almost identical with that figured by Martynov for his *forcipatus*. The central processes of the ninth tergite are shorter than the lateral ones, a character which may well be variable. The main difference is that each clasper has a long, slender, semi-transparent process arising from the inner surface near the base. This is not shown in Martynov's figure, but may have been overlooked. Martynov makes no mention of the unforked media in the hind wing, but it seems unlikely that such similar male genitalia could have evolved independently in what are otherwise distinct genera.

Athripsodes ungulifera sp. n.

(Text-figs. 49–54)

The specimens have been in alcohol for nearly thirty years and are now a uniform, reddish brown colour, wings sparsely pubescent. In the fore wing of the male, the radial sector and the media fork at about the same level, roughly one-third from the base of the wing. In the female fore wing there is the usual additional apical cell.



FIGS. 49–54. *Athripsodes ungulifera* sp. n. 49, ♂ wings ; 50, ♂ genitalia, lateral ; 51, ♂ dorsal ; 52, ♂ claspers and aedeagus, ventral ; 53, ♀ genitalia, lateral ; 54, ♀ ventral.

♂ GENITALIA. Ninth segment rather short, its apical dorsal margin produced at its centre in a shallow, convex lobe. Tenth tergite trifid, its median lobe broadly triangular in dorsal view, sides gently sinuous. From the side, it tapers sinuously to an acute apex, resembling a talon. The lateral lobes of the tenth tergite are slender, nearly as long as median lobe, slightly upcurved and acute, appearing to arise from the lateral margins of the ninth segment. Cerci fused at their inner basal angles, forming a transverse plate or hood, with a wide, V-shaped excision. The aedeagus is stout, subcylindrical, its lower apical margin with a deep, V-shaped excision. The aedeagus encloses membrane and three stout spines. Claspers in shape resembling those of *A. alboguttata*, rather stouter at base, particularly in ventral view. The hinged apical branch is produced mesally at its apex in an acute triangle.

♀ GENITALIA. Ninth tergite moderately produced at centre of its apical margin, the sides produced downwards and then mesally to form two thin, rounded lobes, meeting ventrally. Lateral gonapophyses short, foliate. Between them and projecting beyond the produced margins of the ninth tergite is a short, triangular subgenital plate, with a truncate apex. Tenth segment membranous, cerci short and tapering to acute apices.

Length of fore wing, ♂, 7 mm., ♀, 6·5 mm.

Holotype ♂ (mounted as microscope preparations), N. E. BURMA : Kambaiti, 6,700 ft., 12.vii.1934 (*R. Malaise*), STOCKHOLM.

Allotype ♀ (mounted as microscope preparations), same data, BMNH.

Paratypes, same locality, 6–7,000 ft., 1934 ; 4.iv., 12 ♂, 5 ♀ ; 30.iv., 5 ♂, 14 ♀ ; 11.v., 4 ♂, 4 ♀ ; 12.v., 9 ♂, 8 ♀ ; 23.v., 1 ♂ ; 7–9.vi., 7 ♂, 6 ♀ ; 12.vii., 5 ♀ (*R. Malaise*), STOCKHOLM, BMNH.

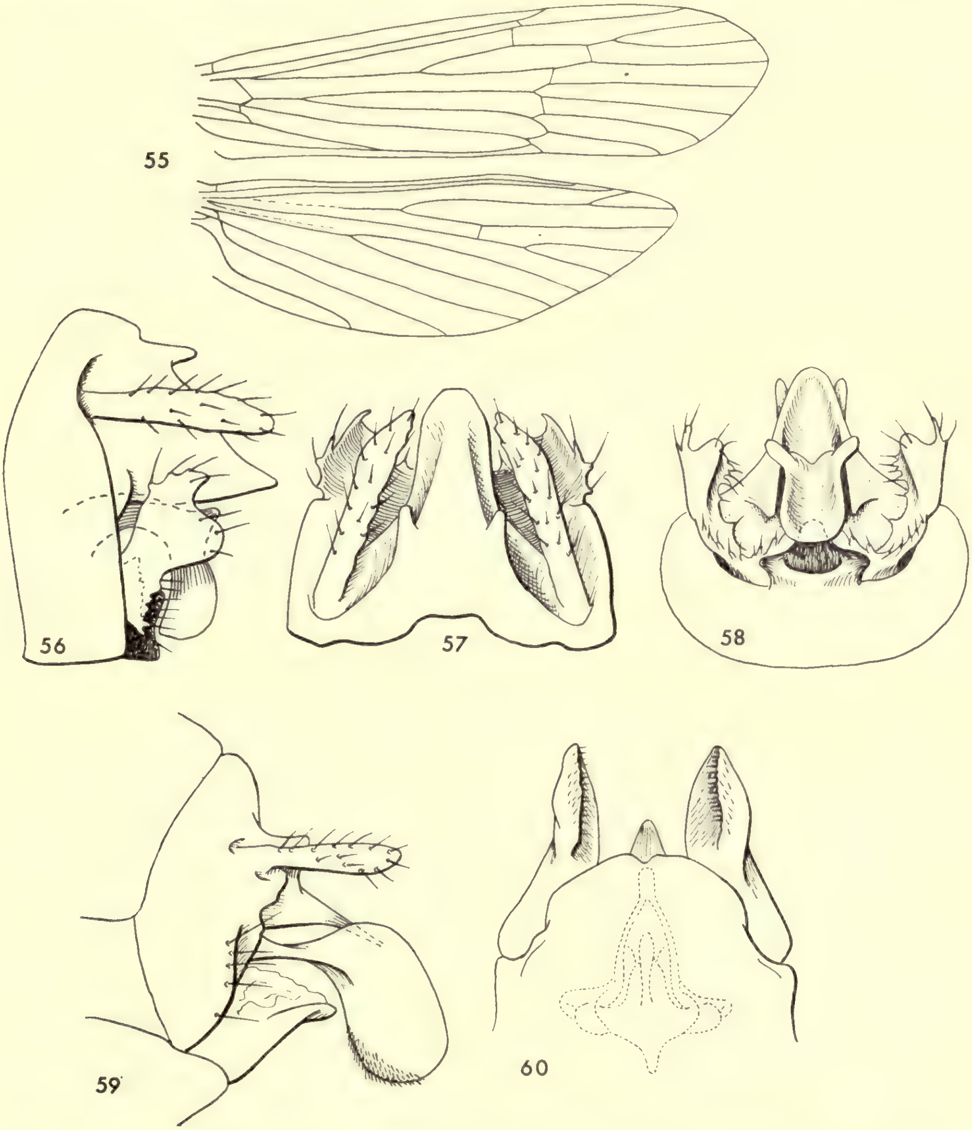
In the possession of slender lateral lobes to the tenth tergite and in the partly fused cerci, this species resembles *A. ensifera* (Martynov), from the Amur region. The latter species also has stout spines in the aedeagus, although only two. The ventral margin of the ninth sternite in *ungulifera* is not produced in slender rods, the claspers are stouter basally, with differently formed apical branches, the median lobe of the tenth tergite is broader basally and more sinuous in side view and the cerci are broader.

***Tagalopsyche fletcheri* sp. n.**

(Text-figs. 55–60)

Head dark brown, with fuscous setae, mixed with fine, golden pubescence. Antennae about twice as long as fore wing, two basal segments with fuscous setae, remaining segments pale chocolate. Maxillary palpi long, fuscous, with fuscous pubescence, articulations marked with whitish pubescence. Thorax fuscous, with sparse, golden pubescence. Legs pale fuscous, with fuscous and whitish pubescence. Fore wing narrow, apex acutely rounded, membrane fuscous, densely clothed with short, fuscous pubescence, intermingled with golden, which forms vague patches in the apical half. The veins are also speckled with white pubescence and along the anal veins are several tufts of erect, piceous setae. Fringes piceous. Hind wing with fuscous membrane and sparse, fuscous pubescence, denser along the veins. In the hind wing, the so-called " false vein " (*MP* of Martynov) before Cu_1 is rather more evident than usual.

♂ GENITALIA. Ninth segment narrowed dorsally and fused with tenth tergite. Viewed from beneath, the ventral margin is produced at its centre in a short, transverse process, wider at its apex, the apical margin with a wide and shallow, V-shaped excision. Seen from behind, this process is also produced dorsally, so that it forms a triangle with rounded angles and a concave centre, the whole heavily pigmented. Tenth tergite forming a deep, triangular hood, with a pair of blunt processes on its dorsal surface near the base. Cerci about as long as tenth tergite, slender, digitate, slightly incurved. Aedeagus short, strongly arched downwards and with the lateral margins beyond midway produced upwards and outwards in triangular lobes. Clasper arising from a narrow base, thin and foliate, its upper angle clavate in side view, with an excised apex, upper margin incurved and serrate along its dorsal margin. Lower angle of clasper extended inwards, parallel to margin of ninth segment, its apical margin produced in small papillae or teeth, each terminating in a seta.



Figs. 55–60. *Tagalopsyche fletcheri* sp. n. 55, ♂ wings ; 56, ♂ genitalia, lateral ; 57, ♂ ninth and tenth tergites, dorsal ; 58, ♂ ninth segment, claspers and aedeagus from below and behind ; 59, ♀ genitalia, lateral ; 60, ♀ ventral.

♀ GENITALIA. Cerci about as long as ninth segment, slender, digitate. Tenth segment fused to ninth, extending as a narrow, triangular plate or hood, thin and transparent, nearly as long as cerci, with a triangular projection on each side at the base. Lateral gonapophyses with very slender, short bases, apices somewhat reniform in side view, directed downwards, concave internally, lower margins setose.

Length of fore wing, ♂, 7–8 mm., ♀, 8 mm.

Holotype ♂ (pinned), INDIA : Palnis, 7,000 ft., Kodaikanal, viii.1921 (*T. B. Fletcher*), BMNH.

Allotype ♀ (pinned, abdomen cleared and in glycerine), same data as holotype, BMNH.

Paratypes, same data as holotype, 6 ♂ ; same locality, 21.viii, 9.ix.1929, 2 ♂ (*T. B. Fletcher*) ; same locality, 23–24.iii.1936, 16 ♂, 2 ♀ (*G. M. Henry*), BMNH and Colombo Museum.

This species differs from *T. brunnea* (Ulmer) in the shape of the ♂ claspers and in the ♂ ventral process of the ninth segment. In the female, it differs in the more reniform lateral gonapophyses with very slender bases, straighter cerci and a more acute apex to the tenth segment.

Setodes unispina Martynov

N. BURMA : Washaung, c. 200 m., 20 km. E. of Myitkyina, 14.vii.1934, 4 ♂ (*R. Malaise*), STOCKHOLM, BMNH.

Such wing pattern as remains on these specimens resembles that figured by Banks for his *Setodes lineata*, and Martynov's species may prove to be synonymous with *S. lineata*. Pending study of the genitalia of Banks's type, the name *S. unispina* should be used.

Previous distribution. INDIA, Chota Nagpur.

***Setodes fluvialis* sp. n.**

(Text-figs. 61–64)

♂ (in alcohol). General colour tawny yellow. Head with three narrow, longitudinal stripes of silvery, scale-like hairs. Antennae incomplete. Mesonotum with two narrow, longitudinal, silvery stripes. Fore wing almost completely denuded, but the membrane with hyaline streaks and scattered silvery, scale-like hairs in the cells, suggesting that the wing originally had silvery streaks.

♀ GENITALIA. Ninth tergite narrow above, with a small lobe projecting from centre of apical margin. Tenth tergite short, saddle-shaped. Cerci short and slender. Aedeagus abruptly arched downwards about midway, with a dorsal projection just basad of the bend. From above, this projection is rhomboidally dilated at its apex, with a median, longitudinal depression. Apex of aedeagus acute in side view, from above bifid, each branch triangularly dilated at apex. At the base of the aedeagus arise two stout parameres, also abruptly downturned at one fourth from base, about as long as aedeagus. At the angle, each paramere is laterally compressed and somewhat convolute, then becoming spiniform, with a bifid apex. Clasper with a long, slender ventral branch and a stout, bifid upper branch. The uppermost of the two forks is incurved, with serrate margins.

♀ Unknown.

Length of fore wing, ♂, 6 mm.

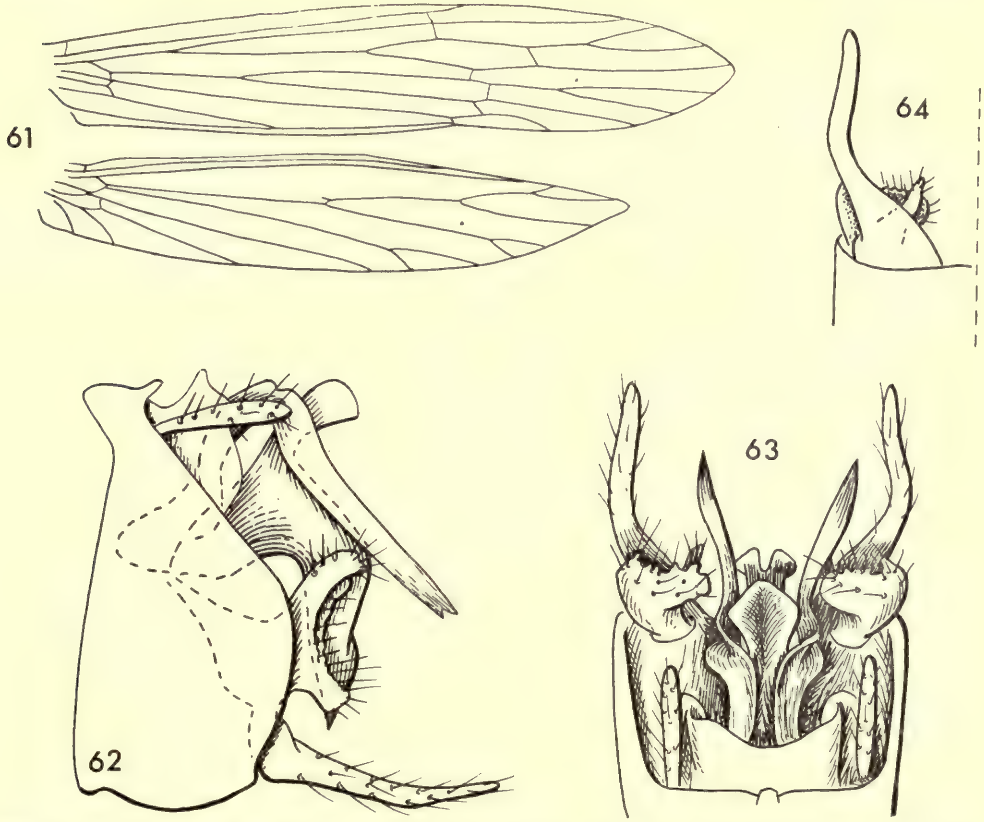
Holotype ♂ (mounted as microscope preparations), N. Burma : Waingmaw, 175 m., near Myitkyina, 15.iii.1934 (*R. Malaise*), STOCKHOLM.

In male genitalia, this species recalls *S. iris* Hagen, from Ceylon, and the wings are probably similarly streaked with white on a gold ground. *S. fluvialis* has a similar short, arched tenth tergite and slender cerci, strongly arched aedeagus and parameres. The aedeagus and parameres are, however, relatively shorter and the claspers are differently formed. Both species have a long, slender ventral branch to the clasper, but the two separate upper branches of *iris* are, in *fluvialis*, fused into a bifid branch.

Setodes exposita sp. n.

(Text-figs. 65–68)

♂ (pinned, rather rubbed). Head fulvous, with sparse, golden hairs. Antennae fulvous (incomplete). Palpi fulvous. Thorax fulvous, legs luteous. Wings hyaline, much denuded, fore wing with traces of pale golden pubescence and about six small patches of fuscous pubescence in the costal area. Hind wing with *Rs* obsolete from the base of the discoidal cell, fork R_2 wanting.



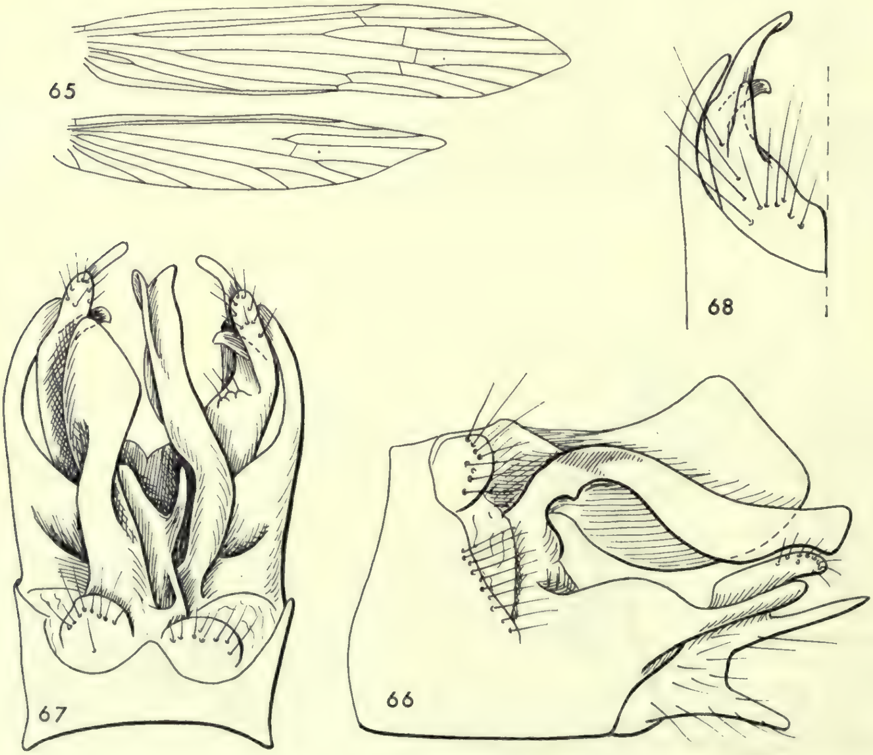
Figs. 61–64. *Setodes fluvialis* sp. n. ♂. 61, wings ; 62, genitalia, lateral ; 63, dorsal ; 64, left clasper, ventral.

♂ Genitalia. Ninth segment long ventrally, short dorsally. Lateral margins in the lower half produced distally in a long, slender finger, extending outside and almost to the apex of the clasper. The base of this process is extended mesally to the base of the aedeagus. Cerci reduced to two rounded, flattened plates. Beyond them extends the tenth tergite, very asymmetric, the right-hand side forming a large plate, set on edge, clavate apically, reaching almost to the apex of the aedeagus. The left side of the tenth tergite forms a small, apically directed hook or spine. The whole tergite tends to be displaced to the right side of the abdomen and beneath it is the aedeagus, which is somewhat to the left of the median line. In side view, the aedeagus is narrow basally, sinuous, slightly dilated before the apex, which is truncate. From above, the apical half has a median, longitudinal groove. Claspers with a common basal apodeme, dividing into four apical branches. The uppermost is sausage-shaped and below it at its base is a hinged, claw-like branch, hidden in side view by the spiniform process of the ninth segment. The third and longest branch is blade-like, slightly incurved and separated by a wide excision from the fourth branch, directed caudad.

♀ Unknown.

Length of fore wing, ♂, 8 mm.

Holotype ♂, in alcohol, (one pair of wings and abdomen mounted as microscope preparations), N. E. Burma : Kambaiti, 2,000 m., 15.v.1934 (*R. Malaise*), STOCKHOLM.



Figs. 65–68. *Setodes exposita* sp. n. ♂. 65, wings ; 66, genitalia, lateral ; 67, dorsal ; 68, left clasper, ventral.

The large, asymmetric tenth tergite and the complex claspers of the male should make this species easily recognisable.

Setodes argentivaria sp. n.

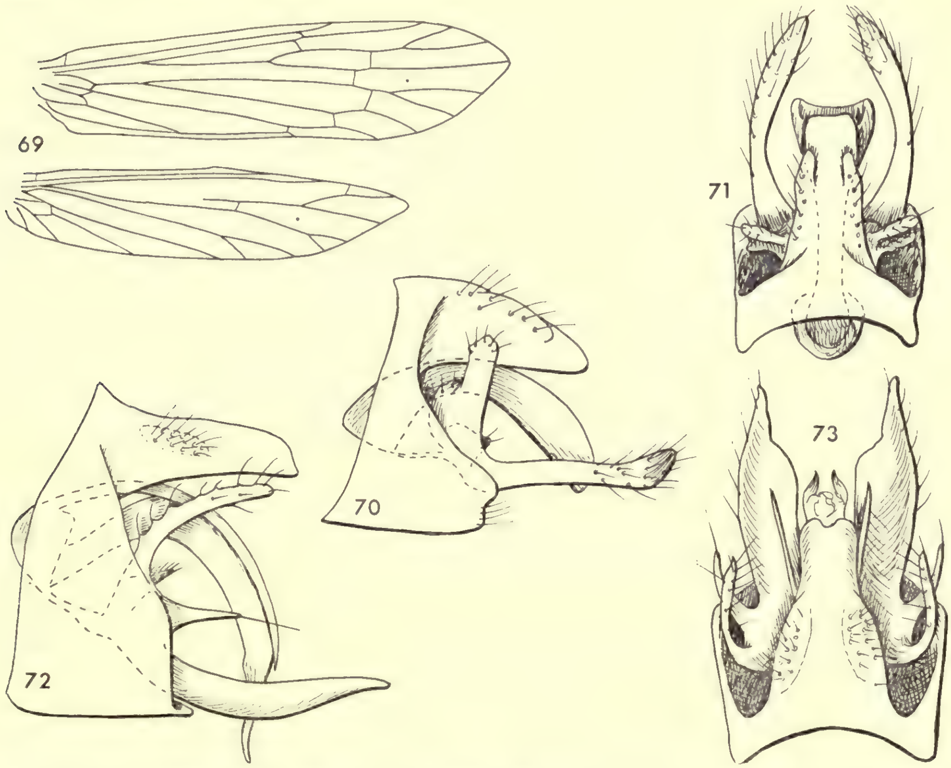
(Text-figs. 69–71)

♂ (in alcohol). General colour pale tawny yellow. Antennae faintly annulated with fuscous. Legs pale yellowish. Fore wing with fairly dense, golden yellow pubescence, speckled with darker yellow along the costa and with numerous silvery spots. Hind wing with sparse, yellowish pubescence. Wings less narrow than in *S. fluvialis* and *S. exposita*, with broader apical forks. *Rs* in fore wing arising at level of medio-cubital fork.

♂ Genitalia. Ninth segment dorsally very short, its ventral apical margin slightly produced at centre. Tenth tergite fused to ninth, forming an elongate hood. In side view it tapers to a rounded apex, from above truncate. Cerci partly fused to tenth tergite, apices digitate in dorsal aspect. Aedeagus arched in side view, apex trough-shaped from above. Clasper long, slender, slightly incurved, with a stout basal branch, which is directed upwards. From above, the apex of the basal branch is broad, forming a transverse ridge.

♀ Unknown.

Length of fore wing, ♂, 4 mm.



Figs. 69–73. *Setodes* spp. 69–71, *S. argentivaria* sp. n. ♂. 69, wings ; 70, genitalia, lateral ; 71, dorsal ; 72–73, *S. argentifera* McLachlan, genitalia of ♂ type. 72, lateral ; 73, dorsal.

Holotype ♂ (mounted as microscope preparations), S. SHAN STATES: Shwenyang, N. end of Lake Inle, 900 m., 26.viii.1934 (*R. Malaise*), STOCKHOLM.

Paratypes (in alcohol), same date, 26 ♂, STOCKHOLM, BMNH.

This species recalls *S. argentifera* McL. (Text-figs. 72–73), with its silvery spots on the fore wing. It is however much smaller and the male genitalia, although similar, differ considerably in detail. The tenth tergite is produced in a hood in both species but in *argentivaria*, the cerci are less reduced, and there are no parameres. The lower branch is narrower in dorsal view and the basal branch more compact. Figures of the genitalia of the type of *argentifera* are given for comparison.

***Setodes forcipata* sp. n.**

(Text-figs. 74–78)

♂. Specimens much bleached to a tawny yellow, and denuded by long storage in alcohol. Legs rather long and slender. Wings almost bare but with traces of white, scale-like hairs.

♂ GENITALIA. Ninth segment fused with tenth and reduced dorsally to a narrow, transverse rib. Cerci short, slender, arising from the fused ninth and tenth segments. Aedeagus strong, arched abruptly downwards before midway and projecting upwards between the cerci. Beyond the angle, the upper surface bears a longitudinal groove. From the apex of the aedeagus project two slender, sinuous spines and in the membrane at their bases are two more short spines. Clasper long, about one and a half times as long as ninth segment, moderately broad at the base, tapering to slender, acute, incurved apices. There is a small, finger-like basal branch arising from the upper margin at the base and beyond it a small, triangular projection.

♀ GENITALIA. Eighth sternite produced in a large subgenital plate, extending about half way along the ninth segment, its apical margin excised at the centre and deflexed. Ninth tergite more or less fused to tenth, the latter extending as a shallow hood, whose apical margin is acutely excised at the centre. Cerci short, digitate. Lateral gonapophyses narrow basally, apical margin from side dilated and sinuous, lower apical produced downwards and mesally in a rounded, setose lobe. Between the lateral gonapophyses, in ventral view, is a thin, sclerotized plate with a triangular apical margin, beyond and above which extends a short finger.

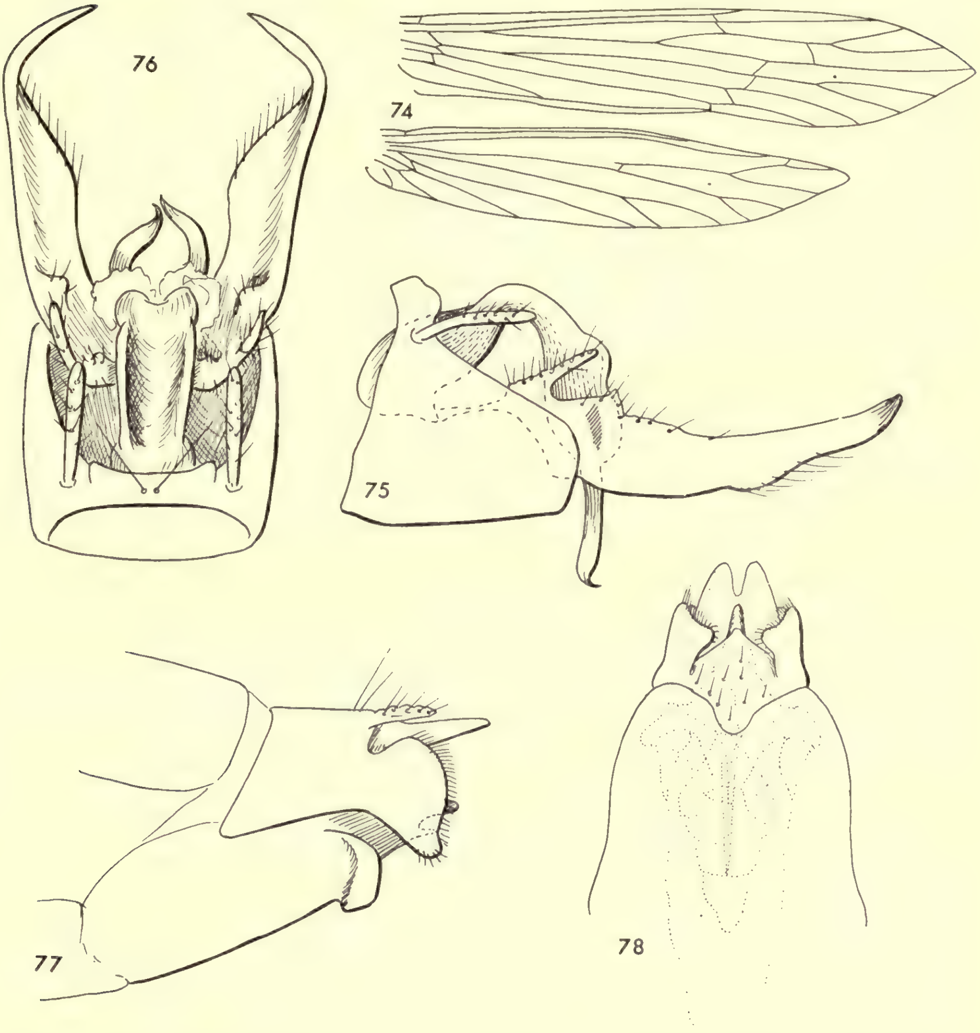
Length of fore wing, ♂, ♀, 5·5 mm.

Holotype ♂ (mounted as microscope preparations), N. E. BURMA: Kambaiti, 7,000 ft., 11.v.1934, (*R. Malaise*) STOCKHOLM.

Allotype ♀ (mounted as microscope preparations), same locality, 18.v.1934 (*R. Malaise*), BMNH.

Paratypes, same locality, 6,000 ft., 4.iv., 17.v., 3 ♂; 16, 18.v., 2 ♀ (*R. Malaise*), STOCKHOLM, BMNH.

In the shape of the male claspers, this recalls *S. crossotus* and *S. moselyi* Martynov, from the Amur region, but it differs from them in the less developed tenth tergite and in the shape of the aedeagus. The latter somewhat resembles the structure figured by Martynov as the tenth tergite in *S. amurensis*.



Figs. 74–78. *Setodes forcipata* sp. n. 74, ♂ wings ; 75, ♂ genitalia, lateral ; 76, ♂ dorsal ; 77, ♀ genitalia, lateral ; 78, ♂ ventral.

Setodes nagarjouna Schmid

(Text-fig. 79)

India : Assam, Cherrapunji, 1 ♂, BMNH.

The male genitalia of this example differ slightly from the figure given by Schmid (1961 : pl. 18, fig. 1). The processes of the tenth tergite are stouter basally and then more suddenly constricted ; the ventral branch of the clasper is more curved caudad. In view of the limited material available to me, and the difference in locality, it is proposed to consider the Assam male as no more than a variety.

Previous distribution. PAKISTAN : N.W. Frontier Province, Balakot.

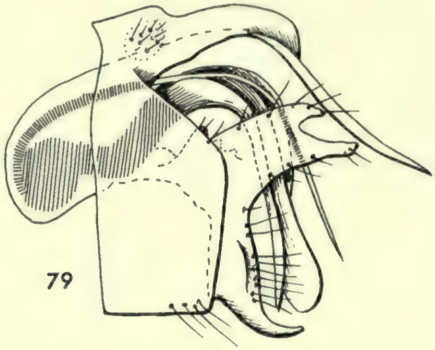


FIG. 79. *Setodes nagarjouna* Schmid, var., ♂ genitalia, lateral.

***Setodes* sp.**

INDIA : Assam, Cherrapunji, 3 ♀ (2 incomplete), BMNH.

These examples have yellowish pubescence on the fore wing, with a pattern of elongate, snow-white streaks and spots. In the absence of an associated male, they are left undetermined.

Parasetodes maculata (Banks)

Leptocella maculata Banks, 1911 : 104 (India).
Leptocella bakeri Banks, 1914 : 177 (Philippines). **Syn. n.**
Parasetodes bakeri (Banks) Ulmer, 1951 : 415 (Sumatra, Ceylon, India).

INDIA : Bihar, Pusa, 23.vii.1924, 9 ex. (*Mukerjee*), 23.vii.1913, 2 ex. (*R.M.P.*) ; Brahmaputra River, Goalundi–Gauhati, vii.1919, 2 ex. (*T. B. Fletcher*).

CEYLON : Peradeniya, ii, iii, vi.1911, 3 ex. (*J. C. F. Fryer*).

BURMA : 1899 (*McLachlan collection*), 1 ex. ; Prome, 18.ii.1918, 1 ex. (*A. G. R.*), all above in BMNH.

Also recorded from MALAYA and SIAM.

***Mystacides khasica* sp. n.**

(Text-figs. 80–83)

Head piceous, antennae with basal segments pale reddish brown, remaining segments luteous, more or less annulated with fuscous. Palpi piceous, with dense, reddish black pubescence. Thorax piceous, legs fuscous, with paler pubescence. Wing membrane fuscous, with a metallic sheen. Anterior wing with dense, coppery brown pubescence, arranged in three transverse bands, one near the base, one about mid-way, across the base of the discoidal cell and the third at the apex. The dense pubescence also extends along the costal area. Between these bands the membrane exhibits the iridescent metallic sheen. Posterior wing with sparse, coppery brown pubescence.

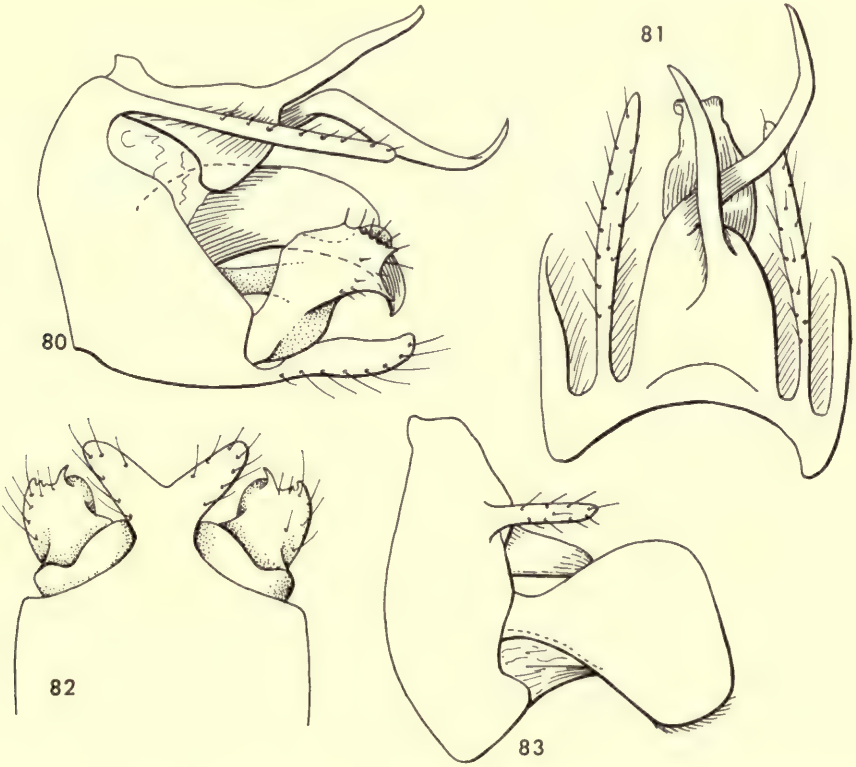
♂ Genitalia. Ninth segment narrowed dorsally and from its apical margin arises a pair of long, slender cerci, one on each side of the tenth tergite. Ventral margin of the ninth segment produced at its centre in a bifid process, the arms of which diverge approximately at right angles to each other. Tenth tergite produced in a pair of asymmetric spines, the right spine the longer, sinuous and passing beneath the left. Aedeagus stout, curving downwards and in side view tapering to an acute apex. Claspers with inner basal margins fused and hinged to base of aedeagus. In side view they are somewhat clavate apically, the lower margin before the apex produced in a short spine. The apex of the clasper is grooved, the outer lateral margin being finely serrate and the inner forming a rounded lobe.

♀ Genitalia. Of the general pattern of *M. azurea*, but the lateral gonapophyses are roughly triangular rather than quadrangular, the anterior and posterior margins not being parallel and the base is relatively narrower.

Length of fore wing, ♂, ♀, 8 mm.

Holotype ♂ (pinned), India : Assam, Khasi Hills (*McLachlan collection*), BMNH.

Allotype ♀ (pinned, abdomen cleared and in glycerine), India : Khasis, 5,000ft., Shillong, 25.v.1928 (*T. B. Fletcher*), BMNH.



Figs. 80–83. *Mystacides khasica* sp. n. genitalia. 80, ♂ lateral ; 81, ♂ ninth and tenth tergites, dorsal ; 82, ♂ ninth segment and claspers, ventral ; 83, ♀ genitalia, lateral.

Paratypes (pinned), INDIA : Khasi Hills, 6 ♂, 5 ♀ (*McLachlan collection*) ; Khasis, 5,000 ft., Shillong, 1.vi.1924, 7.ix.1927, 11.vi.1928, 2 ♂, 1 ♀ (*T. B. Fletcher*), 10.v.1924, 2 ♂ (*B. B. Bose*), v.1929, 1 ♂ (*D. P. Singh*) ; Shillong, 31.v.1918, 1 ♂, 1 ♀ (*V. P. Rao*) ; Shillong, iii.1893, 1 ♂ ; Assam, Cherrapunji (*native collector*), 1 ♀ : Bhimtal, 4,500 ft., 3.x.1922, 1 ♀ (*T. B. Fletcher*), BMNH.

This species is closely related in genital structure to *Mystacides azurea* (L.) and to *M. indica* Martynov (W. Himalayas). From *M. azurea* the male differs in the longer, more slender processes of the tenth tergite and in the form of the claspers. Both have the apex of the latter divided into an inner and an outer lobe, but *khasica* has the ventral margin of the outer lobe below the apex produced into an acute, incurved hook, and the ventral margin near the base is not so strongly produced in an acute process. *M. indica* apparently does not have the apex of the clasper divided into inner and outer lobes, but the ventral margin below the apex is strongly produced in a curved spine. The ventral process of the ninth segment is less deeply excised. *M. dentata* Martynov carries the development of the subapical spine on the ventral margin to a much greater degree. *M. dentata, indica* and *khasica* may possibly prove to be sub-species of *M. azurea*, but the first two species were based on rather limited material.

Mystacides dentata Martynov

N. BURMA : Washaung, 16.iii.1934, 1 ♂ (*R. Malaise*), STOCKHOLM.

Martynov's figure of the male genitalia of this species is rather small and badly reproduced. This Burmese example appears to agree reasonably well with it and on the limited material available it is placed as *M. dentata*.

***NIETNERELLA* gen. n.**

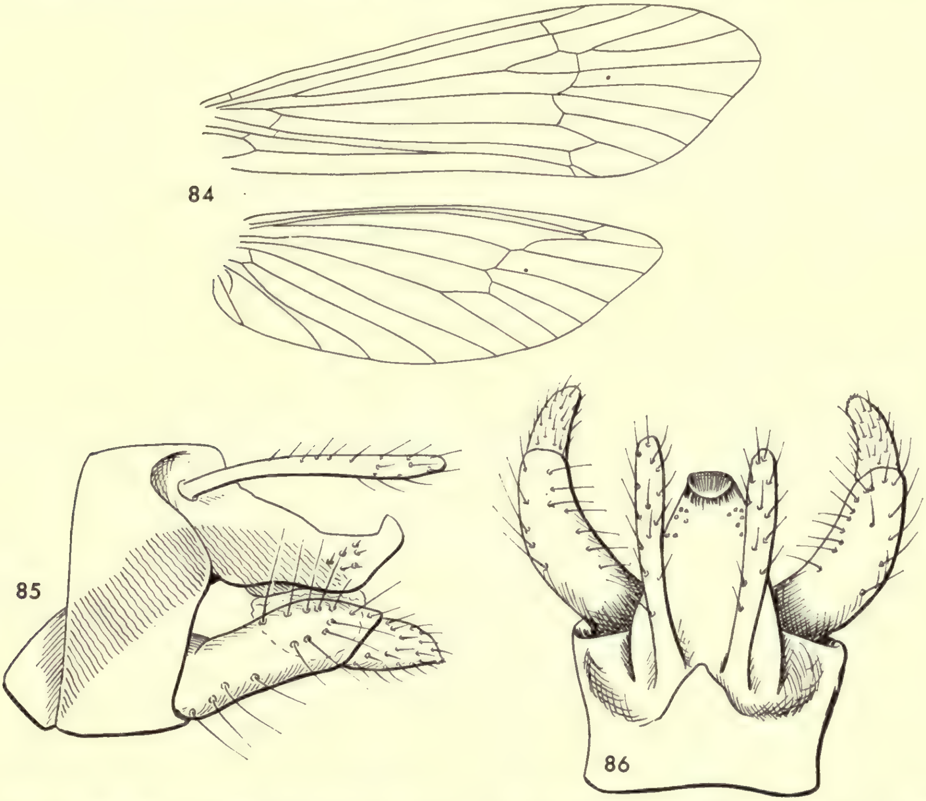
Spurs 2, 4, 4, one of the anterior spurs very small. Antennae long and slender. Maxillary palpi with segments three to five subequal, segment two about two-thirds as long as three, segment one a little shorter than two. Fore wing with very short discoidal cell, fork R_2 with a very short footstalk. Thyridial cell reaching almost to base of wing. The free part of R_5 falls upon M_{1+2} shortly beyond the fork of M. In the hind wing, R_1 appears to terminate in a cross-vein between Sc and R_2. Fork R_2 shortly stalked, free part of R_5 falls upon M_{1+2}. M_{3+4} linked to Cu_{1a} by a cross-vein.

♀ Unknown.

Type-species, *Nietnerella hageni* gen. sp. n.

This genus shows affinities with the Odontoceridae and the Calamoceratidae as well as with the Leptocerinae. The cross-vein linking M_{3+4} and Cu_{1a} in the hind wing is not normally present in the Leptocerinae, but does occur in both Odontoceridae and Calamoceratidae. The formation of fork R_4 in both wings is very Leptocerine in character and the open discoidal cell in the hind wing rules out the Odontoceridae. There is no median cell, which rules out the Calamoceratidae. The presence of four spurs on the median tibia has not been previously recorded in the Leptocerinae, but less importance is attached to the spur formula as a generic character than was the case. The genus is therefore placed in the Leptocerinae, pending the discovery of more material of both sexes.

This genus shares with *Leptorussa* Mosely the character of four spurs on the hind tibia, but may be distinguished from it by having four spurs on the median tibia also, and by the cross-vein linking M_{3+4} and Cu_{1a} in the hind wing.



FIGS. 84–86. *Nietnerella hageni*, gen. sp. n. ♂. 84, wings ; 85, genitalia, lateral ; 86, dorsal.

Nietnerella hageni sp. n.

(Text-figs. 84–86)

Setodes najas Hagen, 1859 : 210 (partim).

♂ (pinned). Head fulvous, with yellowish hairs. Antennae (incomplete) luteous, towards the base finely annulated with fuscous. Palpi fulvous, with sparse, fuscous pubescence. Thorax and legs fulvous. Fore wing somewhat denuded, pubescence pale golden, with obscure, transverse bars and spots of fuscous pubescence.

♂ GENITALIA. Ninth segment produced at the centre of the dorsal apical margin in a short triangle. Side-pieces broadly rounded. Tenth tergite fused to ninth, broad at base in dorsal view, tapering to a narrow, truncate, upturned apex. In side view, it forms a hood above the aedeagus, the upturned apex being triangular. Aedeagus slender, cylindrical, arched downwards beyond midway, with some obscure membrane extruded from its apex. Clasper stout, two-segmented, the terminal segment less than half the length of the basal, in side view tapering to a narrow, finely spiny apex. From above, the claspers are divergent and slightly incurved.

♀ Unknown.

Length of fore wing, ♂, 7 mm.

Holotype ♂ (pinned, one pair of wings mounted dry between celluloid, abdomen and one fore leg mounted as microscope preparations), CEYLON : Nietner. Hagen. In exchange from Dr. N. Banks, B.M.1931–280, BMNH.

This specimen was one of two examples of *Setodes najas* Hagen from the Hagen collection, the other specimen bearing a M. C. Z. Type number and a label, *Setodes najas* Hagen, in Banks's writing. In general appearance the two are much alike, and as neither had the wings expanded, it is not surprising that Hagen confused two different species. The other specimen has been figured in this paper as *Adicella najas* (Hagen).

OECETIS McLachlan

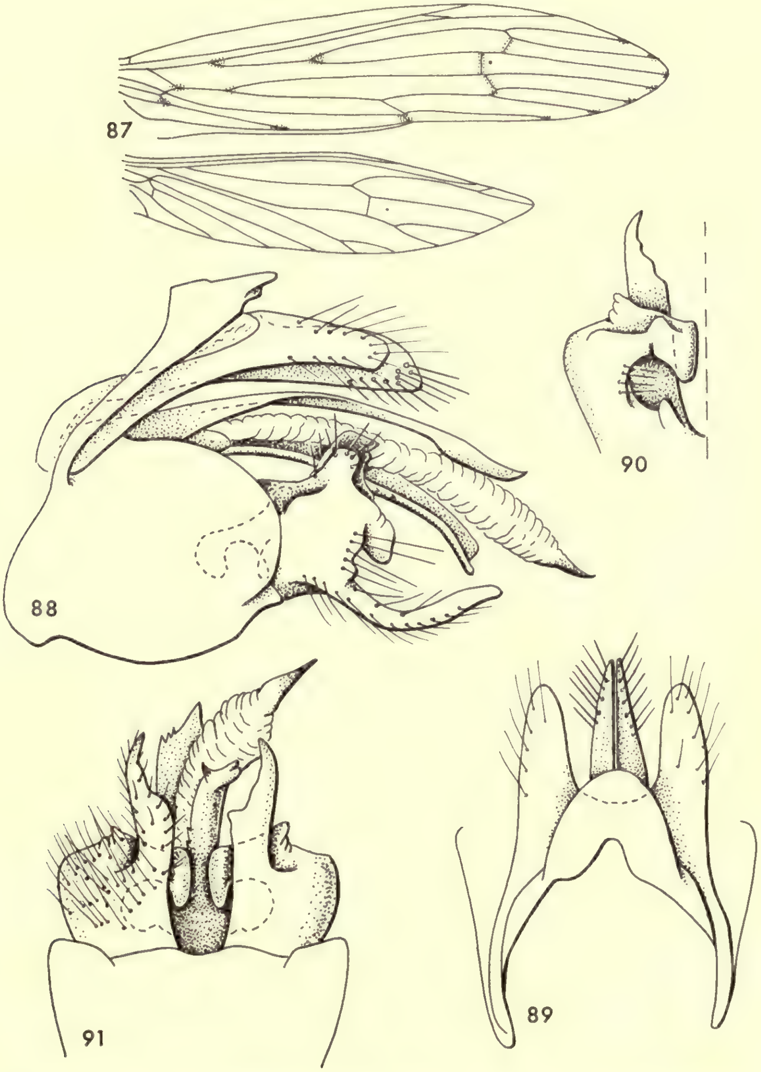
Oecetis McLachlan, 1877 : 329.
Oecetodella Ulmer, 1930 : 467. **Syn. n.**

The genus *Oecetodella* was proposed by Ulmer for a species allied to *Oecetis*, but distinguished from it by having the first and third antennal segments in the male enlarged and bearing a large tuft of long, silky hairs. In the hind wing, the free part of R_5 falls upon M_{1+2} (simulating a cross-vein) and not on the stem of M. In 1951 (p. 412), Ulmer gives these two characters in his key to separate the genera *Oecetis* and *Oecetodella*. Apart from its type-species (*O. singularis*), two other species have been included in the genus *Oecetodella*, *O. antennata* Martynov and *O. laminata* Forsslund. Both of these have the antennae modified as in *O. singularis*, but with R_5 in the hind wing falling on the stem of M. Amongst Burmese and Indian material, I have found two further species in which the basal segments are variously modified and bear dense tufts of silky hair in the males, but in the hind wing R_5 falls upon the stem of M. There are also two other species which have R_5 falling on M_{1+2} in the hind wing, but in which the antennae are not modified in the male. Thus the combination of characters upon which Ulmer based his genus has proved unreliable. One could, of course, drop the venational character and rely on the unisexual character of the male antenna, but this would mean that the females could not be placed generically. I am therefore placing *Oecetodella* Ulmer in the synonymy of *Oecetis* McLachlan.

***Oecetis penicillata* sp. n.**

(Text-figs. 87–91)

♂ (in alcohol, colour probably somewhat faded). Head fulvous, with fulvous and fuscous hairs. Antennae more than twice as long as fore wing, fulvous, finely annulated with fuscous at articulations ; basal segment moderately elongate, second short, third about one and a half times as long, and about as wide basally, as basal segment, tapering to apex. This segment bears on its lower, outer surface a dense pencil of silky, fuscous hairs, extending at least twice the length of the third segment. The inner surfaces of the third to about the eleventh segments are densely clothed with short, fulvous hairs. Pronotum fulvous, meso- and metanota pale fuscous, mesoscutellum and postnotum paler. Legs fulvous. Fore wing hyaline, marked with fuscous at the forks of the veins, the cross-veins of the anastomosis and the apices of the veins. Margins heavily fringed, veins ciliate. Costal margin of fore wing convex beyond the stigma, so that the apex appears slightly swept back. Anastomosis irregular, the free part of R_5 being basad of the other two cross-veins. In the hind wing, the free part of R_5 falls upon *M* well before the bifurcation of that vein.



FIGS. 87–91. *Oecetis penicillata* sp. n. ♂. 87, wings ; 88, genitalia, lateral ; 89, ninth and tenth tergites, dorsal ; 90, right clasper, dorsal ; 91, ninth sternite, claspers and aedeagus, ventral.

♂ Genitalia. Dorsal part of ninth segment forming a narrow arch, the centre of its apical margin produced in a rounded lobe. Lower part of ninth segment large. Tenth tergite produced on each side in a pair of spatulate processes, possibly cerci, and between them can be seen the median lobe, in the form of a pair of closely adpressed processes. From above, the latter taper to narrow apices, projecting somewhat beyond the apices of the cerci. Aedeagus long, consisting ventrally of a narrow, shallow trough with a slightly excised apex, and two processes, the upper sclerotized, slender, about as long as the aedeagus, dilating into a blade with an acute apex. The second process arises beneath the upper, and is largely membranous and extensile, with a sclerotized, thorn-like tooth. Clasper rather complex, stout basally, with its lower apical angle produced in a sinuous, tapering spur with an acute apex. The upper apical angle is produced mesally in a truncate branch, supporting the aedeagus from beneath.

♀ Unknown.

Length of fore wing, ♂, 8·5 mm.

Holotype ♂ (mounted as microscope preparations), N. Burma : Myitkyina, 175 m., 4.iii.1934 (*R. Malaise*), STOCKHOLM.

Paratypes (in alcohol), same date, 9 ♂, STOCKHOLM, BMNH.

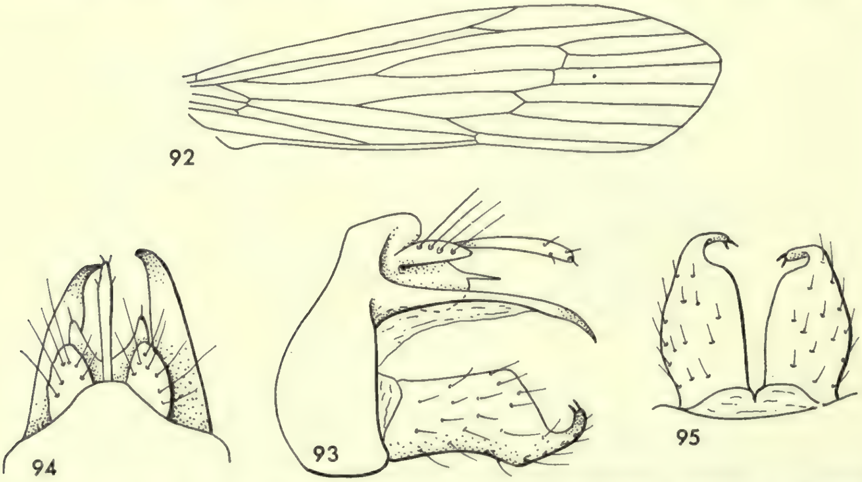
The dense pencil of hairs on the third segment of the antenna suggests a relationship with *Oecetodella antennata* Martynov, from the Amur region, and there are also general resemblances in the male genitalia. *O. penicillata*, however, differs in having its cerci completely fused with the tenth tergite (though projecting beyond it), the median lobe of the tenth tergite forming two adpressed lobes, and the structure of the aedeagus and claspers is quite different.

Oecetis lais (Hagen)

(Text-figs. 92–95)

Setodes lais Hagen, 1859 : 210.

In the British Museum (Nat. Hist.) is a single male paratype of this species, received in exchange from Dr. N. Banks. A preparation has been made of the



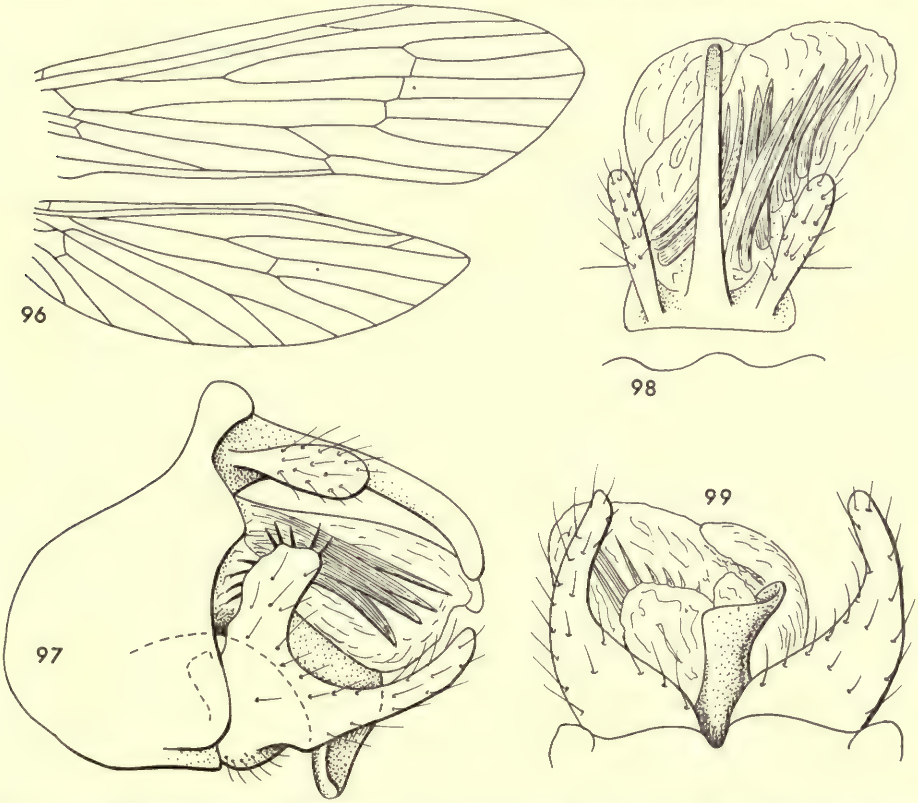
Figs. 92–95. *Oecetis lais* (Hagen), ♂ paratype. 92, wings ; 93, genitalia, lateral ; 94, ninth and tenth tergites, dorsal ; 95, claspers, ventral.

genitalia and they very closely resemble those of *Oecetis sumanasara* Schmid. There may be differences in venation, as Schmid says that in *sumanasara* the discoidal cell of the fore wing is shorter than in *O. naravitta*, in which the discoidal cell is a little shorter than the thyridial cell. In *O. lais*, the discoidal cell is slightly longer than the thyridial cell. I do not propose therefore to place *sumanasara* in the synonymy of *lais*, and am figuring the fore wing and genitalia of the latter. In the paratype of *O. lais*, the aedeagus is missing and the clasper in ventral view appears stouter, with shorter apical processes, although the latter may be a question of aspect. Schmid describes the tenth tergite of *sumanasara* as having two pairs of slender branches, one long, the other short. In *lais*, the long branch is single and the short branch paired, slender in side view, forming the triangular lateral angles of the tenth tergite in dorsal view.

***Oecetis multispinosa* sp. n.**

(Text-figs. 96–99)

♂ (pinned). Head, basal segments of antenna and the palpi fulvous, remaining segments of the antenna creamy white. Antennae incomplete. Thorax and legs fulvous. Fore wing



Figs. 96–99. *Oecetis multispinosa* sp. n. ♂. 96, wings ; 97, genitalia, lateral ; 98, tenth tergite and aedeagus, dorsal ; 99, ninth sternite, claspers and aedeagus, ventral.

hyaline, margins densely fringed, membrane and veins with sparse, fulvous pubescence. The anastomosis is regular, in slightly oblique steps, lightly shaded with fuscous, as is the fork of Cu_1 and the junction of Cu_{1p} and Cu_2. Hind wing hyaline, fringed with fuscous hairs and with sparse, fuscous ciliation on the veins. The free part of R_5 meets the stem of M at less than its own length before the fork of M.

♂ GENITALIA. Eighth tergite with a densely reticulated area. Ninth segment reduced dorsally to a narrow, transverse band. Ventral margin sinuous, with a small, median excision. Tenth tergite extended in a long, digitate process, slightly down-curved at its apex. Cerci about half as long as tenth tergite, slender from above, elongately clavate from the side. Aedeagus stout, down-curved, somewhat asymmetrically trough-shaped. It supports a membranous structure, enclosing more than a dozen stout, arched spines. Clasper bifid from the side, the branches enclosing a wide, rounded excision. The upper or basal branch is shorter than and twice as wide as the apical branch, directed upwards and armed with stout teeth. From beneath, the claspers are broad basally, divergent, then incurving and tapering to blunt apices.

♀ Unknown.

Length of fore wing, ♂, 7 mm.

Holotype ♂ (with one pair of wings and abdomen mounted as microscope preparations), INDIA : Assam, Khasi Hills (*McLachlan collection*), BMNH.

This species is related to *O. biramosa* Martynov, from Orissa, in its reticulated eighth tergite and general pattern of the male genitalia. It differs from that species in having only the eighth tergite reticulated, the longer process of the tenth tergite, the shorter, more clavate cerci and the stouter, more erect basal branch of the clasper. Martynov's figure and description of the aedeagus of *O. biramosa* are made from an uncleared example and in consequence are not sufficiently detailed to decide in what characters it may differ.

Oecetis fletcheri sp. n.

(Text-figs. 100–104)

♂ (pinned). Head and palpi fulvous, with fulvous pubescence. Antenna fulvous at base, later segments creamy white, with fuscous annulations. The basal and succeeding segments bear dense, silky, fuscous pubescence on the outer, lower surfaces. The basal and second segments are normal in size, the third is about as wide, or wider, than the basal segment, but not elongated and the following segments gradually narrow down to the normal width. The silky pubescence also gets progressively shorter as the segments narrow. Thorax dark fulvous, with fulvous pubescence, legs luteous. Fore wing hyaline, with sparse, fuscous pubescence on membrane and longer ciliae on veins, margins densely fringed. Anastomosis slightly concave, shaded with fuscous and with fuscous spots on the forks of the veins. The free part of R_5 arises basad of the cross-vein closing the discoidal cell and falls on M at its fork. M_{3+4} is linked to Cu_{1a} by a short cross-vein. Hind wing hyaline, heavily fringed, the free part of R_5 falling on M at about its own length before the fork.

♂ GENITALIA. Ninth segment narrowed above, slightly produced at its centre. Side-pieces of ninth segment short and incurved. Tenth tergite with its median lobe produced in a long, laterally compressed finger (in the dorsal figure this is rather fore-shortened). Beneath it are two short, membranous lobes, each terminating in a seta. Cerci about half as long as tenth tergite, digitate. Aedeagus large, downcurved, forming an asymmetric trough, with two acute teeth ventrally, one at apex and the other about half way. Protruding from the trough are two membranous fingers, one containing two stout spines. Claspers caliper-like in ventral view, with a small tooth on the upper margin before the apex. At the base of each clasper is an upwardly and mesally curved branch, nearly as long as the main branch.

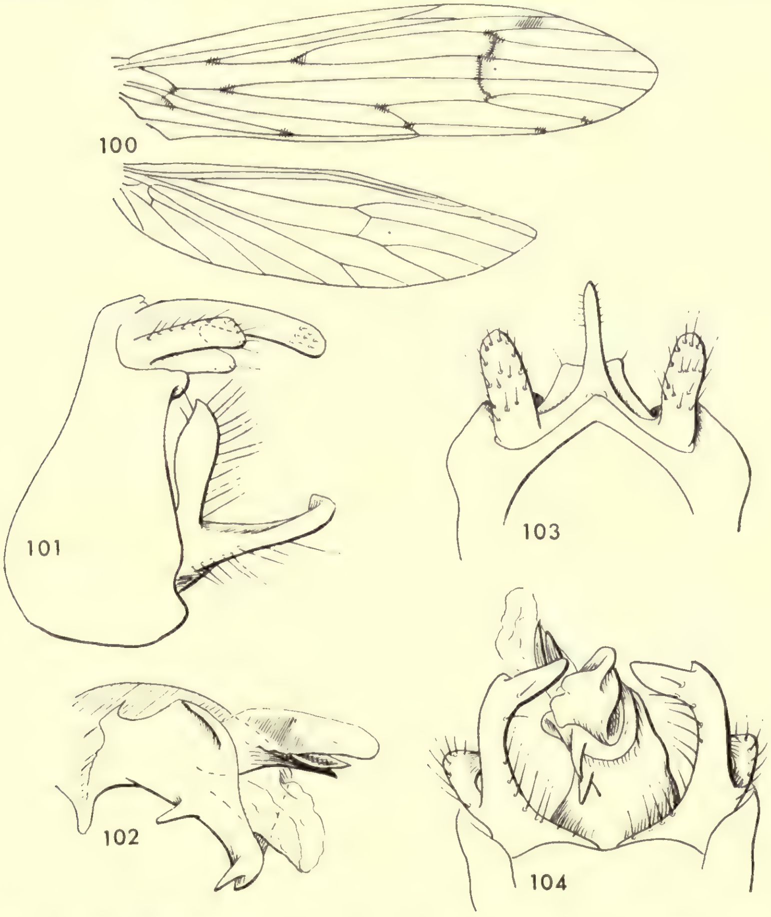
♀ Unknown.

Length of fore wing, ♂, 8 mm.

Holotype ♂ (one wing mounted dry, abdomen and one antenna in glycerine), INDIA : Assam, Khasis, 5,000 ft., Shillong, 26.ix.1927 (*T. B. Fletcher*), BMNH.

Paratypes, same locality and collector, 12.viii.1927, 1 ♂ ; Khasis, Cherrapunji, vii.1894, 1 ♂ (*native collector*), BMNH.

At first glance, the structure of the male antenna recalls that of *O. penicillata* sp. n., but in that species the third segment is greatly elongated and most of the hair-tufts arise from that segment. In *fletcheri*, the third segment is widened but not lengthened and the tufts arise from the second to thirteenth segments. The



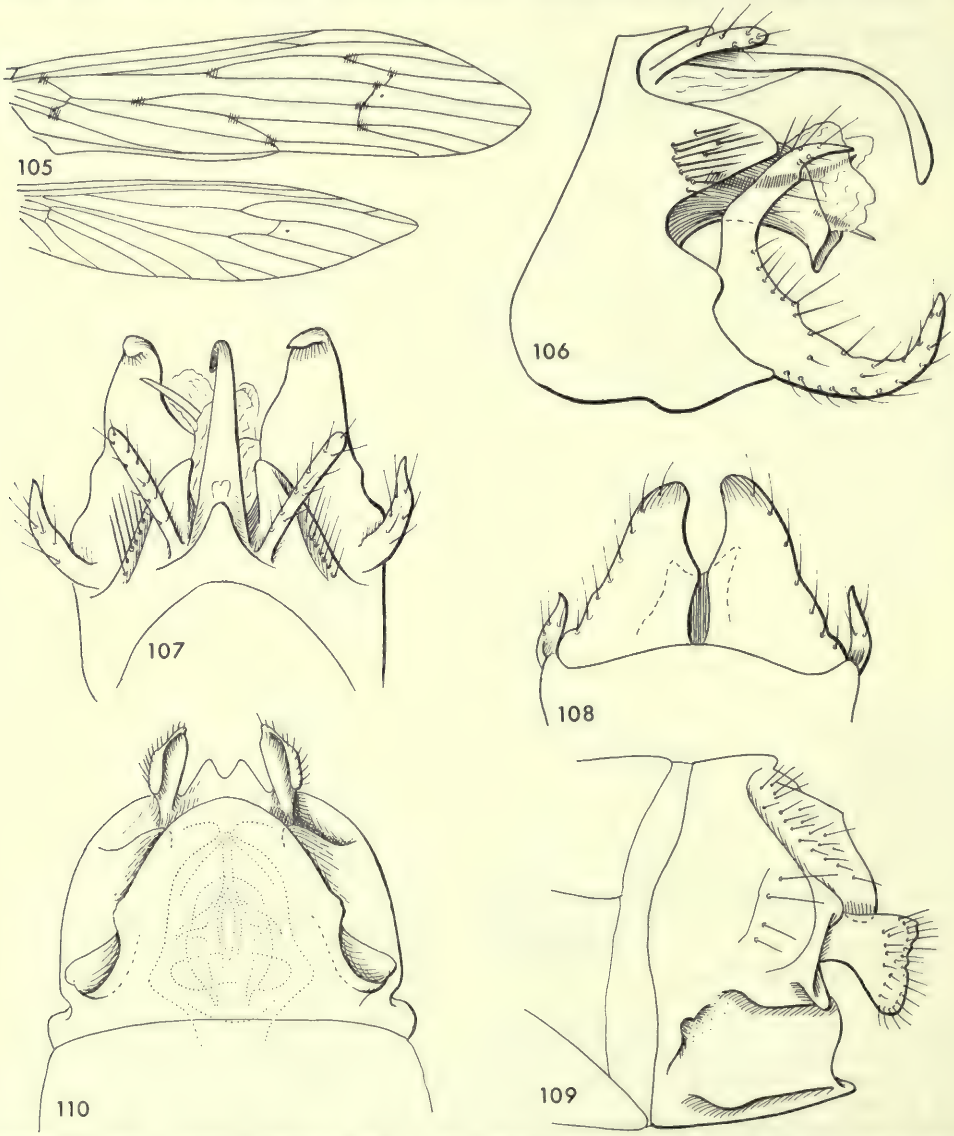
FIGS. 100–104. *Oecetis fletcheri* sp. n. ♂. 100, wings ; 101, genitalia, lateral ; 102, aedeagus, lateral ; 103, ninth and tenth tergites, dorsal ; 104, ninth sternite, claspers and aedeagus, ventral.

genitalia are, however, quite different and in the bifid structure of the claspers are related to *O. multispinosa* sp. n.

***Oecetis cristata* sp. n.**

(Text-figs. 105–110)

♂ (pinned). Head and basal segment of antenna fulvous, with fulvous and silvery hairs, remaining segments of antenna luteous, with faint, fuscous annulations. Palpi fulvous, with



Figs. 105–110. *Oecetis cristata* sp. n. 105, ♂ wings ; 106, ♂ genitalia, lateral ; 107, the same, dorsal ; 108, ♂ claspers, ventral ; 109, ♀ genitalia, lateral ; 110, ♀ ventral.

pale fuscous pubescence. Thorax dark fulvous, legs fulvous, with pearly pubescence. Membrane of fore wing smoky hyaline, apex of wing somewhat swept back. Forks of veins and anastomosis shaded with fuscous and bearing erect tufts of fuscous hairs. Membrane with fine, fulvous pubescence, veins with fulvous ciliae, intermingled with small areas of silvery ciliae. Margins with dense fringes of fulvous, with some areas of silvery, hairs. Veins of anastomosis in an almost straight line. Hind wing hyaline, with fuscous fringes and fuscous ciliae on veins. Free part of R_5 falling on M_{1+2}.

♂ GENITALIA. Dorsal part of ninth segment produced centrally in a triangle with a rounded apex. Side-pieces large, triangular, with stiff, dense setae. Tenth tergite produced in a long, tapering spine, down-curved near its apex. Cerci short, slender, divergent, about as long as side-pieces. Aedeagus short, curved, trough-shaped, apex truncate. Within the trough are a large and a small spine, embedded in membrane. Clasper bifid, from the side with the branches somewhat caliper-like, slender and of about equal length. From beneath, the lower branch is broad, tapering to an upcurved apex.

♀ GENITALIA. Ninth segment produced at centre of its apical, dorsal margin in a small, triangular lobe with a rounded apex, similar to but broader basally than that in the male. Side-pieces rather broad and truncate. Ventral margin produced in a wide, rounded subgenital plate. Lateral gonapophyses small, narrow at base, lower apical angle produced in a rounded lobe. Tenth segment fused to ninth, forming a short, deep anal tube, obliquely truncate in side view, dorsal and ventral margins excised.

Length of fore wing, ♂, ♀, 7 mm.

Holotype ♂ (pinned, one pair of wings mounted dry, abdomen in glycerine), INDIA : Bihar, Pusa, 24.vi.1911, (*T. B. Fletcher*), BMNH.

Allotype ♀ (pinned, abdomen in glycerine), same locality, 8.iii.1915 (*T. B. Fletcher*), BMNH.

The label of the holotype incorrectly indicates Pusa as being in Bengal.

In male genitalia, this species is related to *O. multispinosa* sp. n., but it differs in having no reticulated area on the eighth tergite, the cerci are slender, not clavate, there are only two spines in the aedeagus and the two branches of the clasper are of about equal length and width in side view.

***Oecetis mekana* sp. n.**

(Text-figs. 111–114)

♂ (in alcohol, rather bleached). Head fulvous. Antenna fulvous, articulations finely annulated with piceous. The third segment is elongated, about as long as basal and second together, slightly sinuously arched in basal half. It is now completely denuded, but it is possible that in life it may carry a long pencil of hairs as in *O. pencillata*. Palpi fulvous, with fulvous pubescence. Thorax and legs fulvous. Wings almost completely denuded. Fore wing with membrane hyaline, marked with fuscous at the forks and along the anastomosis, which is broken, the cross-vein closing the discoidal cell distad by its own length from the other two cross-veins, which are close together. In the hind wing, the free part of R_5 falls upon the stem of M more than its own length from the fork of M.

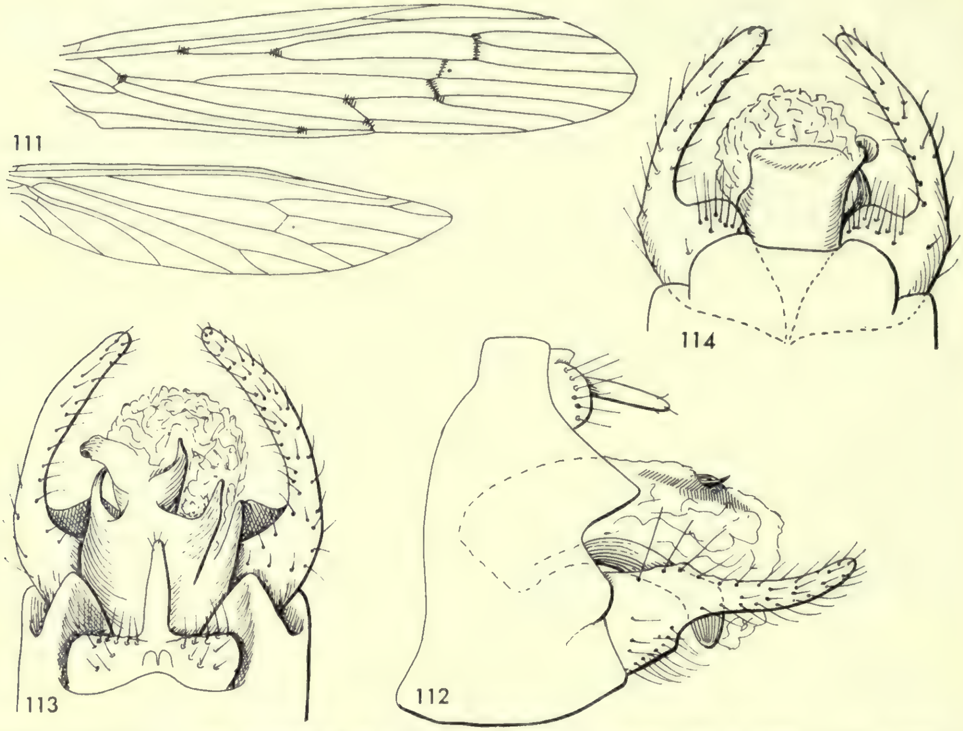
♂ GENITALIA. Dorsal part of ninth segment not very narrow, its apical margin produced in a shallow triangle with rounded apex. Side-pieces large, triangular. Ventral apical margin of ninth segment produced in a broad, rounded lobe, excised medially. Cerci fused with tenth tergite, forming a broad, transverse plate, beyond which extends a short, digitate median lobe. Aedeagus short, stout, the ventral part forming a shallow trough, the upper part terminating in four asymmetric, short spines. The area between is filled with membrane. Claspers broad at their bases in ventral view, then suddenly constricted and incurved. From the side they are also broad basally but not so suddenly constricted.

♀ Unknown.

Length of fore wing, ♂, 6 mm.

Holotype ♂ (mounted as microscope preparations), TENASSERIM : Mekane, 90 km. E. of Moulmein, 200 m., 2–8.xi.1934 (*R. Malaise*) STOCKHOLM.

The broad fused cerci and the structure of the aedeagus should make this species easily recognisable.



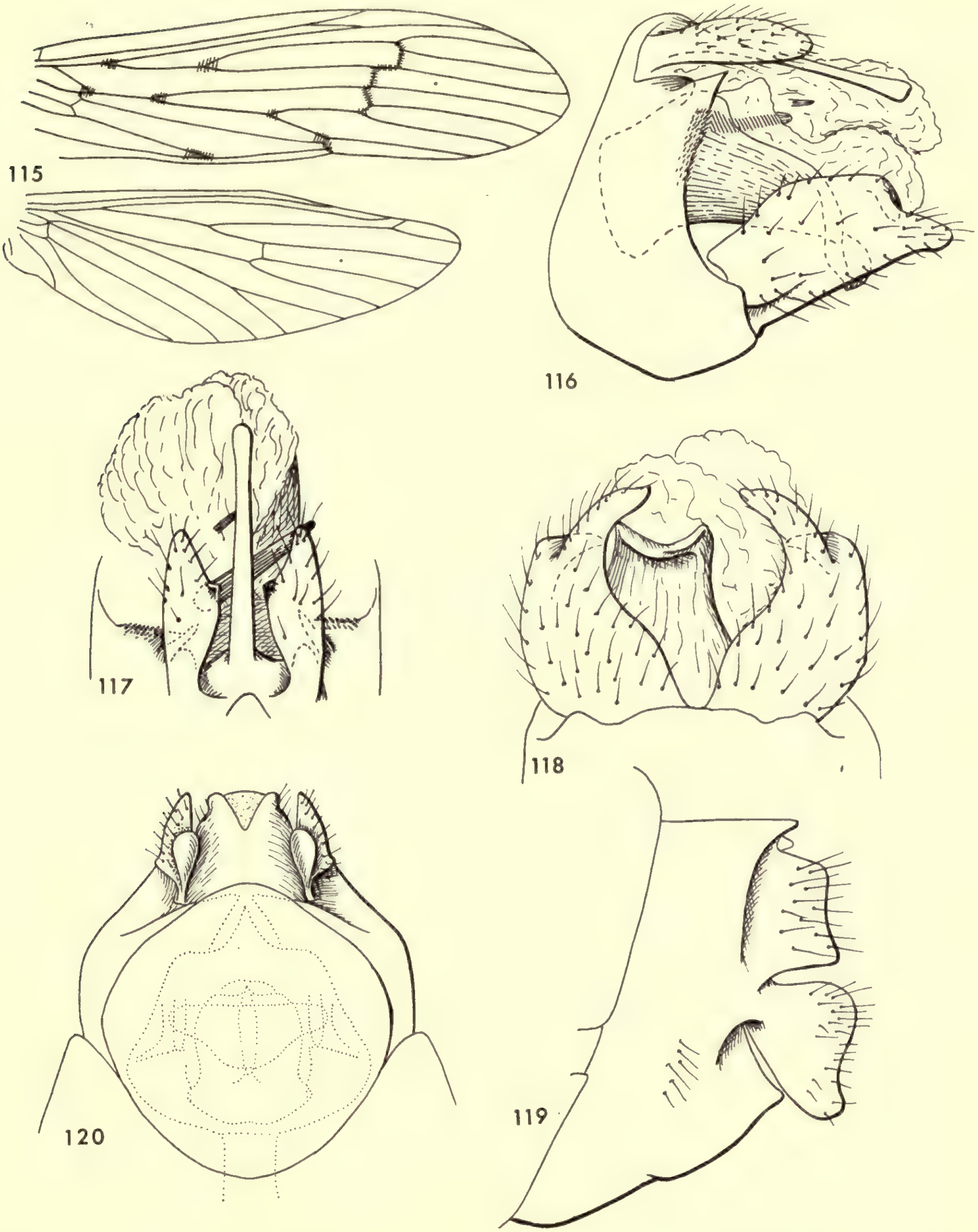
FIGS. 111–114. *Oecetis mekana* sp. n. ♂. 111, wings ; 112, genitalia, lateral ; 113, dorsal ; 114, ninth sternite, claspers and aedeagus, ventral.

Oecetis villosa sp. n.

(Text-figs. 115–120)

♂ (pinned). Head fulvous, with slightly darker hairs, antennae fulvous, scarcely annulated, palpi fulvous with pale fuscous pubescence. Thorax and legs fulvous. Membrane of fore wing hyaline, forks and anastomosis shaded with fuscous. Anastomosis broken, cross-vein closing the discoidal cell about its own length beyond the others. Margins of fore wing and the veins densely clothed with long, fuscous hairs. Hind wing hyaline, margins and veins densely hairy. The free part of R_5 falls on M_{1+2}, shortly beyond the fork of M.

♂ GENITALIA. Tergites of seventh and eighth segments reticulated. Dorsal part of ninth segment narrow, the centre of its apical margin produced in a small triangle. Side-pieces of the ninth segment acutely triangular, the lower margin with an area of dense, acute serrations. Tenth tergite produced in a long, slender finger, about twice as long as cerci. The latter are



FIGS. 115–120. *Oecetis villosa* sp. n. 115, ♂ wings ; 116, ♂ genitalia, lateral ; 117, ♂ ninth and tenth tergites, aedeagus, dorsal ; 118, ♂ ninth sternite, claspers and aedeagus, ventral ; 119, ♀ genitalia, lateral ; 120, ♀ ventral.

stout, slightly dilated about midway in side view, triangularly dilated on inner margin in dorsal view, the dilatation ending in a small, down-turned tooth. Aedeagus large, trough-shaped, its apex turned down in a broad lip. The trough is filled with membrane containing a large and a small spine. Clasper stout in side view, about twice as long as deep, the upper apical angle more abruptly angled mesally in a claw than the lower angle.

♀ GENITALIA. Dorsal apical margin of ninth segment produced at its centre in a small triangle. Ventrally there is a large, ovate subgenital plate. Lateral gonapophyses narrow basally, lower apical angle produced downwards and dilated. Upper apical angle rounded. Tenth segment forming a short anal tube, obliquely truncate apically, lower margin excised.

Length of fore wing, ♂, 7·5 mm., ♀, 7 mm.

Holotype ♂ (pinned, one pair of wings mounted dry, abdomen in glycerine), INDIA : Assam, Khasi Hills (*McLachlan collection*), BMNH.

Allotype ♀ (pinned, abdomen in glycerine), INDIA : Assam, Cherrapunji, BMNH.

In the form of the tenth tergite, side-pieces of the ninth segment and aedeagus of the male and in the general pattern of the female genitalia, this species resembles *O. cristata* sp. n. It may be distinguished in the male by the presence of reticulated areas on the seventh and eighth tergites and by the stout claspers, and in the female by the shorter anal tube and larger lateral gonapophyses.

***Oecetis angulata* sp. n.**

(Text-figs. 121–126)

♂ (pinned). General colour fulvous. Antennae about three times as long as fore wing, the third segment long, slightly arched near the base, giving the appearance of a transverse impression on the under side. Fore wing hyaline, with moderately dense, fulvous pubescence, marginal fringes dense but not very long. Anastomosis only slightly broken, faintly shaded with fuscous and a pale fuscous spot at the arculus. In hind wing, free part of R_5 falls on M well before its fork.

♂ GENITALIA. Ninth segment only slightly produced at centre of its dorsal apical margin, ventral margin produced in a shallow, rounded lobe. Cerci forming a pair of low, convex warts, fused to surface of tenth tergite, which projects only slightly beyond the cerci in a truncate hood, with sides tapering to apex. Aedeagus large, globular, its lower apical margin extended downwards at its centre in a narrow tongue. Within the aedeagus is a single, slightly curved spine. Clasper broad basally, tapering to about midway and continuing as a slender finger, which in ventral aspect is sharply angled inwards.

♀ GENITALIA. Ninth tergite with its dorsal, apical margin produced at its centre. Lower lateral angles produced outwards in small, triangular lobes. Lateral gonapophyses small, ovate in side view, densely fringed with setae. Tenth segment forming a short anal tube, to which the low, rounded cerci are attached. Subgenital plate lightly sclerotized, with an acute tooth projecting from its apical margin.

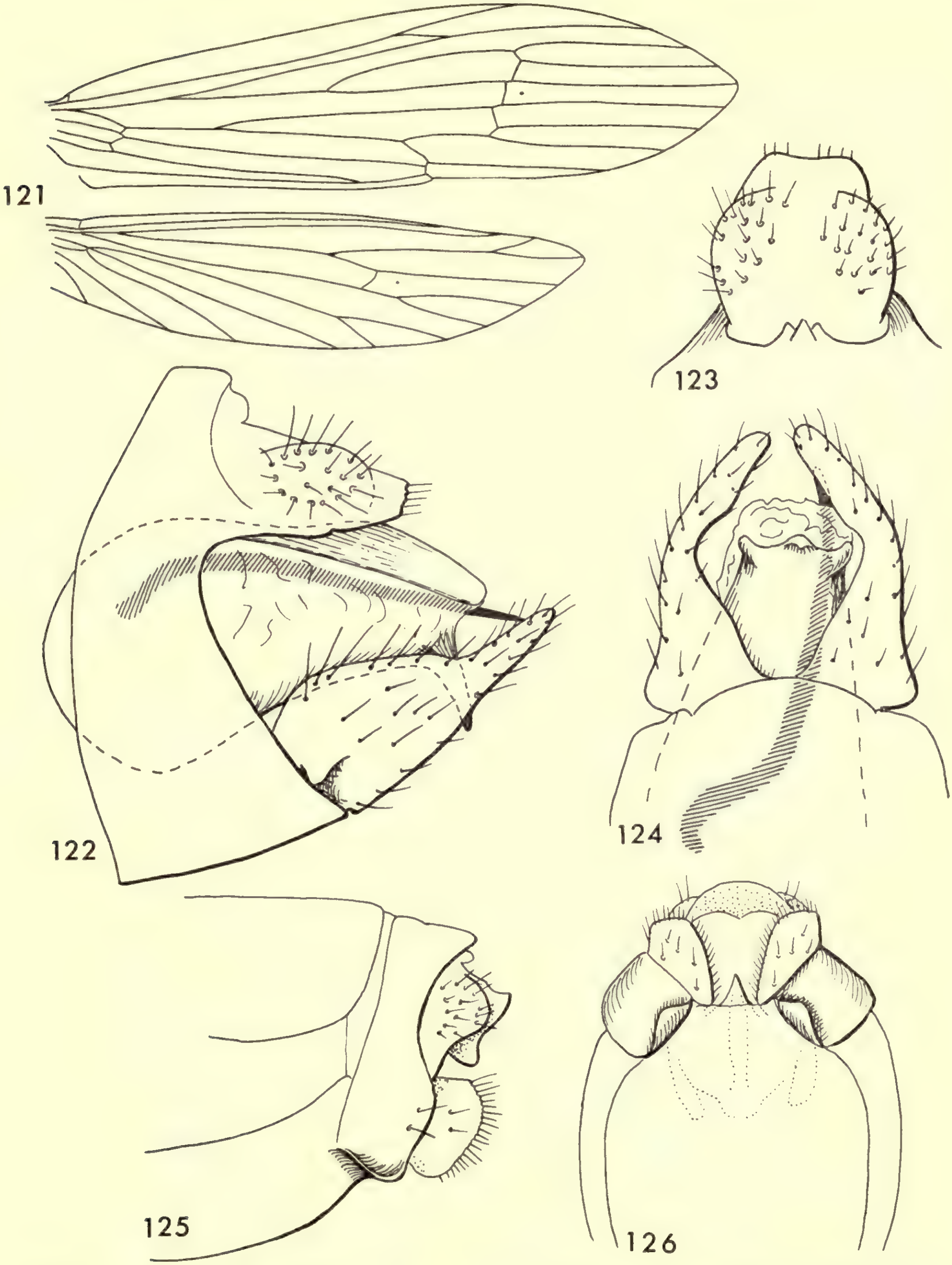
Length of fore wing, ♂, 6–7 mm., ♀, 6 mm.

Holotype ♂ (pinned, one pair of wings mounted dry, abdomen in glycerine), INDIA : Assam, Cherrapunji (*McLachlan collection*), BMNH.

Allotype ♀ (pinned, abdomen in glycerine), INDIA : Assam, Khasi Hills, Cherrapunji (*McLachlan collection*), BMNH.

Paratypes (pinned), INDIA : Assam, Cherrapunji, 1 ♂ ; Assam, Khasi Hills (*McLachlan collection*), 3 ♂, 4 ♀, BMNH.

This species differs from *O. meghadouta* Schmid in its cerci fused to the tenth tergite, which exceeds the cerci, and in the form of the claspers, which taper more gradually in side view and are incurved ventrally.



FIGS. 121–126. *Oecetis angulata* sp. n. 121, ♂ wings ; 122, ♂ genitalia, lateral ; 123, ♂ ninth and tenth tergites, dorsal ; 124, ♂ ninth sternite, claspers and aedeagus, ventral ; 125, ♀ genitalia, lateral ; 126, ♀ ventral.

Oecetis assamensis sp. n.

(Text-figs. 127–130)

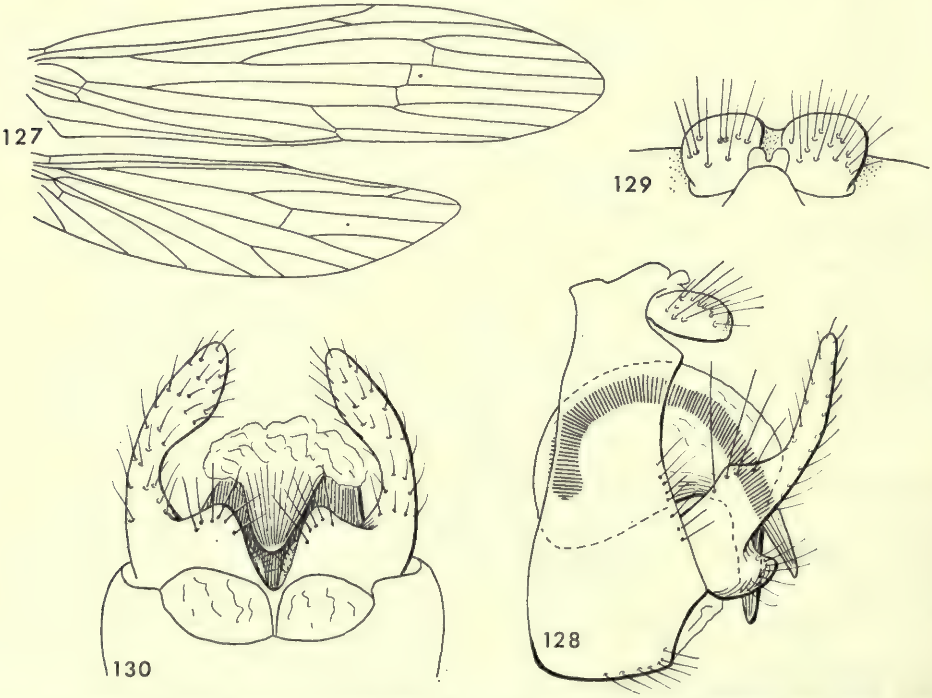
♂ (pinned). Head, antennae and palpi fulvous, with fulvous hairs. Basal segment of antenna large, third segment a little longer than basal, not inflated but slightly arched in basal half as in *O. angulata* sp. n. Thorax and legs fulvous. Fore wing hyaline, with sparse, fulvous pubescence, marginal fringes not very long. Faint, fuscous clouding over the forks and anastomosis. The latter is broken, the cross-vein closing discoidal cell distad by slightly more than its own length from the other two veins, M_{3+4} linked to Cu_{1a} by a short cross-vein. In the hind wing, the free part of R_5 falls on the stem of M more than its own length basad of the fork of M.

♂ Genitalia. Ninth segment dorsally produced at its centre in a rounded lobe, surmounting two tiny, membranous lobes. Side-pieces small. Tenth tergite short, not exceeding the cerci, which are fused to it, making a transverse plate with an excision at centre of its apical margin. Aedeagus large, subglobose, its lower apical margin produced downwards in a tapering tongue. A single, curved spine enclosed within the aedeagus. Clasper in side view slender, upcurved, with a stout, projecting lobe on ventral side at base. From beneath, the clasper is wide, the basal lobe triangular and exceeding the margin ; the apex of the clasper is incurved and slightly clavate.

♀ Unknown.

Length of fore wing, ♂, 8 mm.

Holotype ♂ (pinned, one pair of wings mounted dry, abdomen in glycerine), India : Assam, Khasi Hills (*McLachlan collection*), BMNH.



Figs. 127–130. *Oecetis assamensis* sp. n. ♂. 127, wings ; 128, genitalia, lateral ; 129, tenth tergite, dorsal ; 130, ninth sternite, claspers and aedeagus, ventral.

Paratypes (pinned) same data, 2 ♂; Assam, Cherrapunji, 1 ♂, BMNH.

This species differs from *O. angulata* in the broken anastomosis of the fore wing, the tenth tergite not exceeding the cerci, which are broader than long, and the more slender claspers.

Oecetis submaculosa **sp. n.**

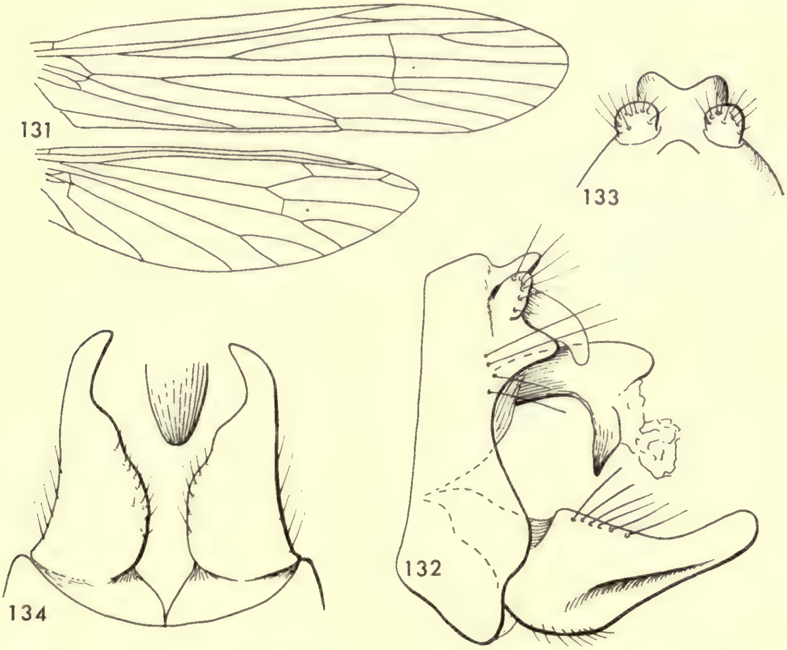
(Text-figs. 131–134)

♂ (pinned). Head fulvous, with pale fulvous hairs. Antennae pale fulvous, with fine, fuscous articulations. Third segment of antennae moderately elongate, but not arched nor with fine, silky pubescence. Palpi fulvous, with pale fuscous pubescence. Thorax pale fuscous, with fulvous pubescence. Legs fulvous, hind femora somewhat darker. Fore wing membrane hyaline, without fuscous shading. Marginal fringes short, membrane clothed with short, fulvous pubescence, with which are mixed small areas of fuscous pubescence, giving the appearance of faint speckles. Fork R_2 with a footstalk, about half as long as fork. Anastomosis straight, M_{3+4} joined to Cu_{1a} by a short cross-vein. Hind wing hyaline, with pale fulvous pubescence. Free part of R_5 falling on the stem of M about its own length basad of the fork.

♂ GENITALIA. Ninth segment short, fused to tenth, side-pieces triangular, apices rounded. Tenth tergite forming a short, somewhat down-curved plate with an excised apex. Cerci short and small, quadrate, not fused to tenth. Aedeagus slender, expanding apically and with its lower apical margin produced downwards in a rounded tongue. Clasper broad at base, tapering to a narrow, finger-like apex, slightly incurved in ventral view.

♀ Unknown.

Length of fore wing, ♂, 9 mm.



FIGS. 131–134. *Oecetis submaculosa* sp. n. ♂. 131, wings; 132, genitalia, lateral; 133, tenth tergite, dorsal; 134, claspers and apex of aedeagus, from below and behind.

Holotype ♂ (pinned, one pair of wings mounted dry, abdomen in glycerine), India : United Provinces, Gorakhpur, 17.xii.1918 (*A. G. R.*), BMNH.

This species differs from all other *Oecetis* dealt with in this paper in having fork R_2 in fore wing stalked ; in this it resembles *O. angustipennis* (Martynov), but that species has entirely different genitalia.

***Oecetis rectangula* sp. n.**

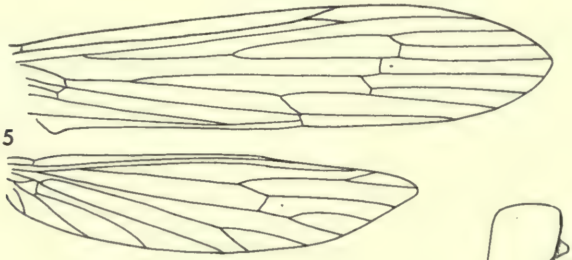
(Text-figs. 135–138)

♂ (pinned). General colour fulvous, antennae luteous, apart from two basal segments, which are fulvous. Third segment not modified. Fore wing hyaline, with sparse, fulvous pubescence. Forks and anastomosis faintly shaded with fuscous, the latter in oblique steps, anterior cross-vein the most distal, basal part of M_{3+4} oblique and joined to Cu_{1a} by a short cross-vein. Free part of R_5 in hind wing falls on stem of M more than its own length basad of fork.

♂ Genitalia. Ninth segment rather short, dorsal apical margin scarcely produced. Side pieces triangular. Tenth tergite in side view projecting in a narrow, straight beak, in dorsal view tapering to a serrate apex. Cerci fused to tenth tergite, about half its length, forming flattened warts. Aedeagus short, trough-shaped, its apex produced downwards in an acute beak. The trough contains membrane but no spine. Clasper in side view broad basally, tapering to a slender, slightly upcurved apex. In ventral view, the apex appears as a digitate projection of a broad, quadrate plate.

♀ Unknown.

Length of fore wing, ♂, 7 mm.



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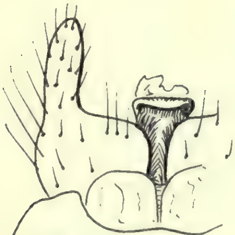

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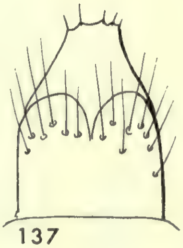

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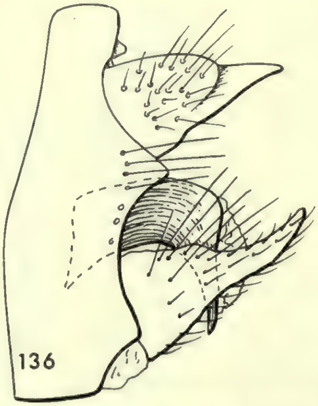

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Figs. 135–138. *Oecetis rectangula* sp. n. ♂. 135, wings ; 136, genitalia, lateral ; 137, tenth tergite, dorsal ; 138, left clasper and aedeagus, from below and slightly behind.

Holotype ♂ (pinned, with one pair of wings mounted dry, abdomen in glycerine), INDIA : Assam, Cherrapunji, BMNH.

Paratype ♂ (pinned), same data, BMNH.

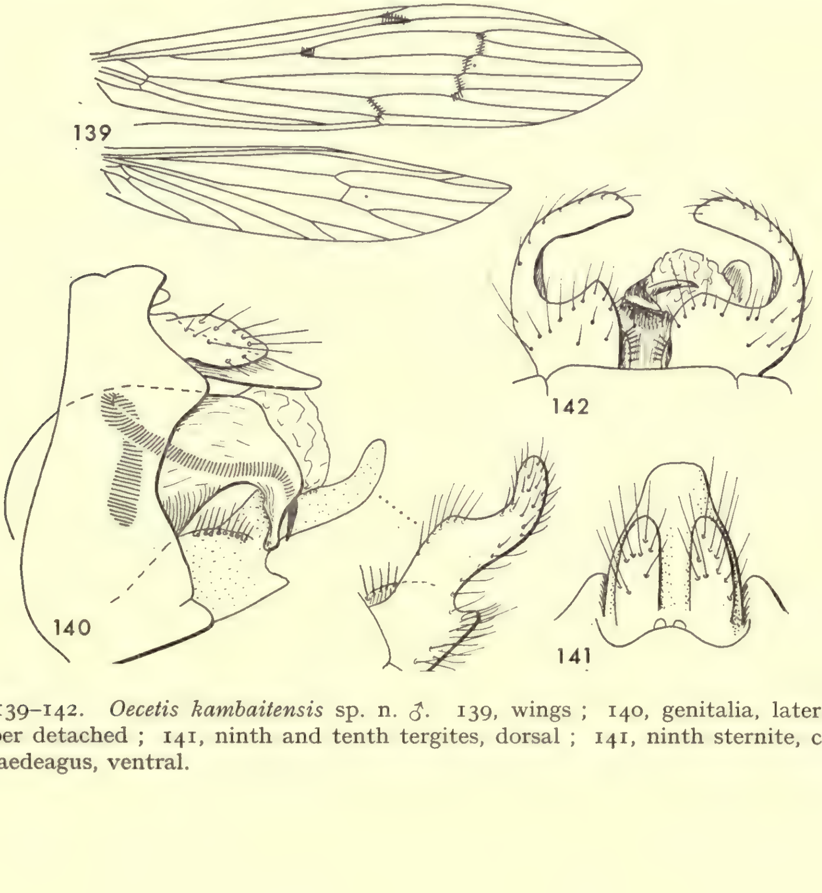
This species differs from *O. assamensis* in its longer tenth tergite, which extends beyond the cerci, the absence of a curved spine within the aedeagus, and in the apical branches of the claspers being straight, not incurved, and enclosing a rectangular space.

Oecetis kambaitensis **sp. n.**

(Text-figs. 139–142)

♂ (in alcohol, much denuded). General colour fulvous. Antennae incomplete, third segment long, slightly arched in basal half. Thorax brownish, legs fulvous. Fore wing hyaline, arculus and anastomosis shaded with pale fuscous. The latter is oblique, slightly stepped, M_{3+4} linked by a cross-vein to Cu_{1a}. In hind wing, free part of R_5 falls on the stem of M more than its own length basad of fork.

♂ GENITALIA. Apical dorsal margin of ninth segment slightly produced in a rounded lobe. Side-pieces bluntly triangular. Tenth tergite about half as long again as cerci, broad at base, tapering to a rounded apex. Cerci spindle-shaped, with blunt apices, closely appressed, but not fused, to tenth tergite. Aedeagus globular at base, containing a spirally-twisted spine, apex



FIGS. 139–142. *Oecetis kambaitensis* sp. n. ♂. 139, wings ; 140, genitalia, lateral, left clasper detached ; 141, ninth and tenth tergites, dorsal ; 141, ninth sternite, claspers and aedeagus, ventral.

of aedeagus produced downwards in a narrow lip. Clasper broad at base, in side view with basal margin visible as a projecting lobe. Main part of clasper sinuous in side view, strongly curved mesally in ventral view.

♀ Unknown.

Length of fore wing, ♂, 7·5 mm.

Holotype ♂ (mounted as microscope preparations), N.E. BURMA : Kambaiti, 6,000 ft. 4.iv.1934 (*R. Malaise*), STOCKHOLM.

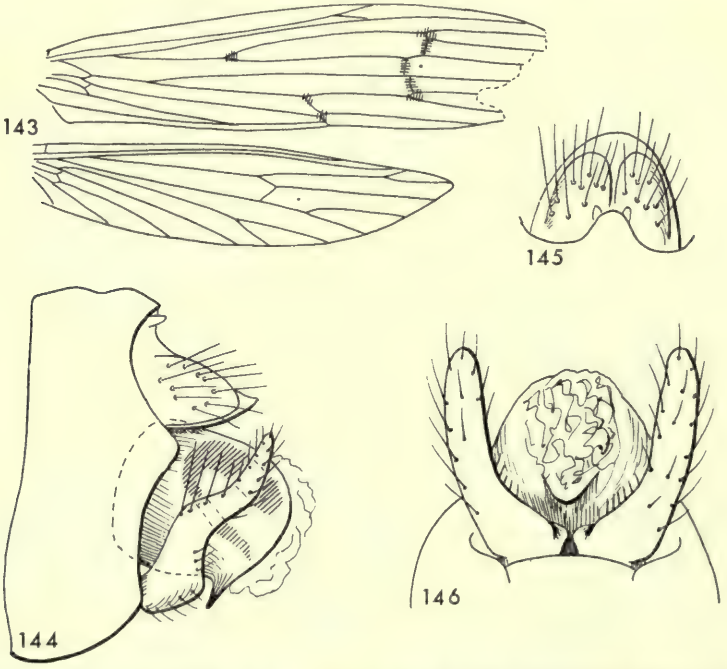
In venation and in general structure of genitalia, this species resembles *O. assamensis*, but it differs in having the tenth tergite extending beyond the elongate cerci, which are not fused to it. The main part of the clasper is narrower and much more strongly curved mesally.

Oecetis sinuata **sp. n.**

(Text-figs. 143–146)

♂ (in alcohol). Insect much denuded, general colour fulvous. Antennae incomplete, third segment very slightly arched at its base. Fore wing hyaline, apex missing, forks and anastomosis lightly shaded with fuscous. Anastomosis broken, the free part of R_5 basad of the other two cross-veins. In hind wing, free part of R_5 falls on the stem of M about twice its own length basad of the fork.

♂ GENITALIA. Apical dorsal margin of ninth segment produced at its centre in a short, narrow lobe with a rounded apex. Side-pieces short and deep. Tenth tergite forming a



FIGS. 143–146. *Oecetis sinuata* sp. n. ♂. 143, wings ; 144, genitalia, lateral ; 145, ninth and tenth tergites, dorsal ; 146, ninth sternite, claspers and aedeagus, ventral.

rounded hood with a flattened apex. Fused to its upper surface are the two ovate cerci. Aedeagus short, globose, enclosing a stout, curved spine. Its lower apical margin is produced downwards in a short, triangular tongue. Clasper moderately slender, sinuate in side view, digitate and divergent in ventral view.

♀ Unknown.

Length of fore wing, ♂, c. 7 mm.

Holotype ♂ (mounted as microscope preparations), N.E. BURMA : Kambaiti, 6,000 ft. 4.iv.1934 (*R. Malaise*), STOCKHOLM.

This species is distinguished from *O. assamensis* and *O. kambaitensis* by the slender, more or less parallel-sided clasper, which is not dilated basally and not incurved apically.

Oecetis nervisquamosa (Schmid) **comb. n.**

Setodes (err. pro *Setodellina*) *nervisquamosa* Schmid, 1958 : 153, pl. 29, figs. 14–15.

INDIA : Assam, Cherrapunji, 1 ♂, BMNH.

N. BURMA : Washaung, c. 200 m., 20 km. E of Myitkyina, 14.vii.1934, 1 ♂ (*R. Malaise*), STOCKHOLM.

Previous distribution. CEYLON.

Oecetis nerviciliata (Schmid) **comb. n.**

Setodellina nerviciliata Schmid, 1958 : 152, pl. 29, figs. 10–13.

S. INDIA : Palnis, 7,000 ft., viii.1921, 1 ♂, (*T. B. Fletcher*), BMNH.

INDIA : Assam, Khasi Hills (*McLachlan collection*) ; Shillong, 5,000 ft., 26.vi.1928, 1 ♂ (*T. B. Fletcher*), BMNH.

Previous distribution. CEYLON.

KEY TO THE MALES OF *Oecetis* FROM THE INDIAN SUB-CONTINENT, CEYLON AND BURMA

Martynov's species *O. tenuis*, *indivisa* and *angustipennis* key out to couplet 26, but his figures are not sufficiently detailed for further separation.

1	Tergite X produced in a slender finger or in a pair of lobes	2
–	Tergite X not so produced, generally more or less fused with cerci	20
2	Tergite X produced in a pair of lobes	3
–	Tergite X digitate	4
3	Lobes of tergite X closely appressed, cerci forming spatulate lobes on each side. Basal and third segments of antenna elongate, the latter clothed with a pencil of dense, long, silky hair	***O. penicillata*** sp. n.
–	Lobes separated, cerci short, quadrate. Antennae normal	***O. malighawa*** Schmid
4	Side-pieces of segment IX produced in long, flattened blades, curving slightly downwards	5
–	Side-pieces only slightly produced	6
5	Lobe of tergite X long	***O. lais*** (Hagen) ***O. sumanasara*** Schmid
–	Lobe short	***O. eburnea*** Schmid
6	Clasper with one or more basal branches	7
–	Clasper without a basal branch	16
7	Basal branch of clasper more than half as long as apical branch in side view	8
–	Basal branch less than half as long as apical	14

8 Tergite VIII reticulated 9
– Tergite VIII not reticulated 12
9 Cerci elongate, clavate 10
– Cerci shorter, not clavate 11
10 Basal branch of clasper longer than apical . . . . ***O. lingua*** Schmid
– Basal branch shorter than apical . . . . ***O. fahieni*** Schmid
11 Tergites VIII, VII and part of VI reticulated . . . . ***O. biramosa*** Martynov
– Only tergite VIII reticulated . . . . ***O. multispinosa*** sp. n.
12 Basal branch of clasper trifid . . . . ***O. hamata*** Ulmer
– Basal branch simple 13
13 Apical branch of clasper from below slender, incurved. Antenna with basal and third segments elongate, densely clothed with long, silky hairs . ***O. fletcheri*** sp. n.
– Apical branch from beneath broad. Antenna normal. ***O. cristata*** sp. n.
14 Basal and apical branches of clasper slender . . . . ***O. dhatusena*** Schmid
– Basal branch stouter than apical 15
15 In hind wing, R_{4+5} falls upon M_{1+2} . . . . ***O. bengalica*** Martynov
– In hind wing, R_{4+5} falls upon the stem of M . . . . ***O. scutulata*** Martynov
16 Claspers slender in side view, or only slightly thickened at base 17
– Claspers stout at base in side view 18
17 Cerci short, forming a transverse plate in dorsal view . . ***O. mekana*** sp. n.
– Cerci longer, flattened, divergent . . . . ***O. ceylanica*** (Ulmer)
18 Tergite X elongate, slender . . . . ***O. villosa*** sp. n.
– Tergite X shorter, broad 19
19 Clasper in side view abruptly narrowed from about half way along upper margin ***O. meghadouta*** Schmid
– Clasper gradually tapering from half way to apex . . . . ***O. naravitta*** Schmid
20 Clasper in side view stout at base, tapering to an acute apex 21
– Clasper in side view either more or less slender throughout, or else with an abrupt narrowing shortly beyond the base 23
21 Aedeagus large, globular, with a single enclosed spine . . ***O. angulata*** sp. n.
– Aedeagus not large and globular, without enclosed spine 23
22 Cerci large, fused to tergite X, whose apex is not bifid. Fork R_2 in fore wing sessile ***O. rectangula*** sp. n.
– Cerci small, not fused to tergite X, whose apex is bifid. Fork R_2 in fore wing stalked ***O. submaculosa*** sp. n.
23 Clasper broad at base, abruptly constricted ventrally near base, strongly incurved in ventral view 24
– Clasper more or less slender throughout in side view, subparallel in ventral view . 25
24 Tergite X not projecting beyond cerci . . . . ***O. assamensis*** sp. n.
– Tergite X projecting beyond cerci . . . . ***O. kambaitensis*** sp. n.
25 Clasper in side view with upper and lower margins sinuous . . . ***O. sinuata*** sp. n.
– Clasper with only upper margin sinuous 26
26 Main veins in fore wing with scales . . . . ***O. nervisquamosa*** (Schmid)
– Main veins in fore wing without scales, although tufts of hairs may be present . 27
27 Veins in fore wing with tufts of black hairs . . . . ***O. punctatissima*** (Schmid)
– Veins with two rows of long, black hairs . . . . ***O. nerviciliata*** (Schmid)

Leptocerus inlensis (Martynov)

Setodes inlensis Martynov, 1936 : 254, figs. 16–18.

S. SHAN STATES : Lake Inle, S. end, 900 m., 10–15.ix.1934, numerous ex. (*R. Malaise*), STOCKHOLM, BMNH.

Recorded distribution. S. SHAN STATES, CEYLON, INDIA.

Leptocerus burmanus sp. n.

(Text-figs. 147, 150–152)

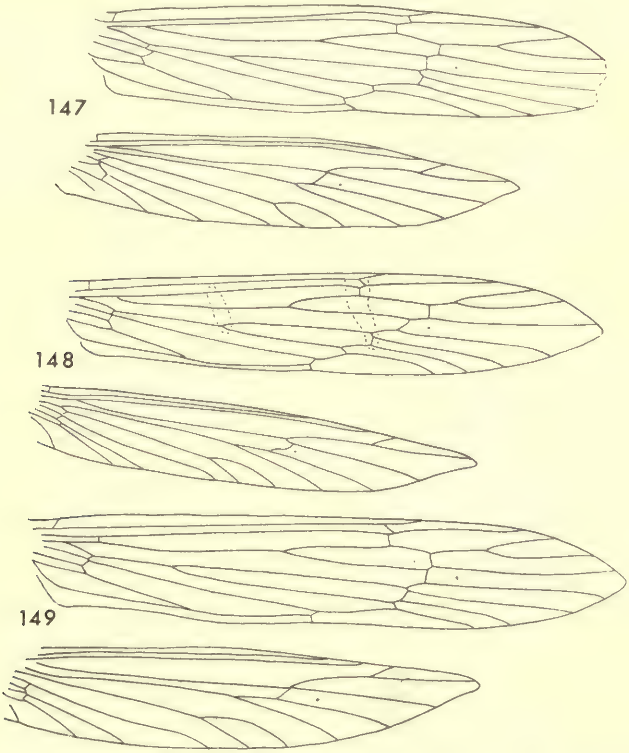
♂ (in alcohol). General colour dark fuscous ; wings rather denuded, fore wing with traces of dark castaneous pubescence and with a white patch on anterior margin about the level of the middle of the discoidal cell.

♂ Genitalia. Ninth segment short dorsally, apical margin ventrally with a wide, V-shaped excision, filled with membrane. Tenth tergite long, median lobe sinuously spiniform in side view, apex downcurved and acute ; from above, it is slightly off-centre. Lateral lobes also spiniform, shorter than median lobe, a little asymmetric, each terminating in two short setae. Cerci reduced to low, rounded warts. Aedeagus trough-shaped, apex rounded and downcurved, filled with membrane and with a single slender paramere, flexibly attached to the dorsal surface. Claspers fused at inner basal angles, enclosing, with the excision of the ninth segment, a membranous, cordate area, and with a short, rounded lobe overlapping the basal angles of the claspers. The clasper is two-branched, the basal branch somewhat rhomboidal in ventral view, reniform in side view and with the inner surfaces set with stout setae. Upper branch arising near the base of the lower branch, slender, sinuous from above.

♀ Unknown.

Length of fore wing, ♂, 5·5 mm.

Holotype ♂ (mounted as microscope preparations), N. Burma : Washaung, 16.iii.1934 (*R. Malaise*), STOCKHOLM.



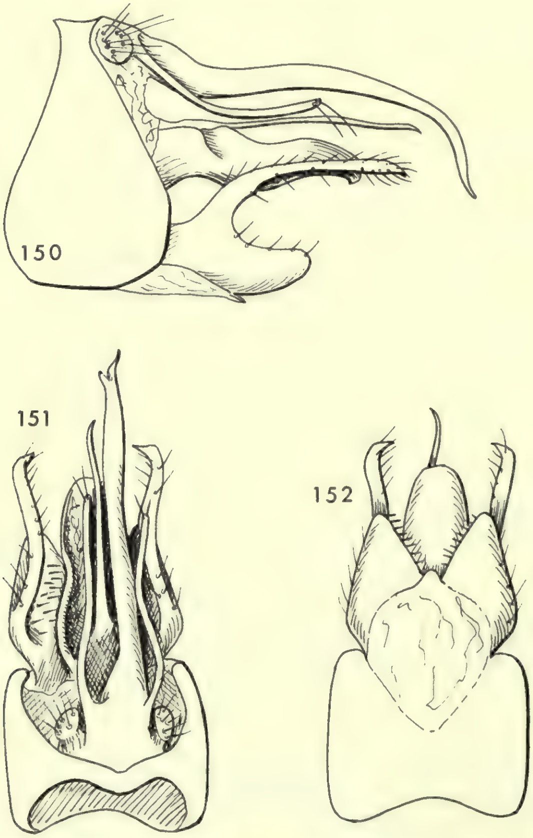
Figs. 147–149. *Leptocerus* spp. n. ♂ wings. 147, *burmanus* ; 148, *cherrensis* ; 149, *bosei*.

In the male genitalia, this species shows some analogy with *L. interruptus* (F.). Both have the long tenth tergite, but in *burmanus* the median lobe is reduced to a single process and the cerci are more developed. The membranous area between the base of the claspers and the apical margin of the ninth segment is crossed by a sclerotized rib in *L. interruptus*, dividing it into two areas.

Leptocerus cherrensis sp. n.

(Text-figs. 148, 153–159)

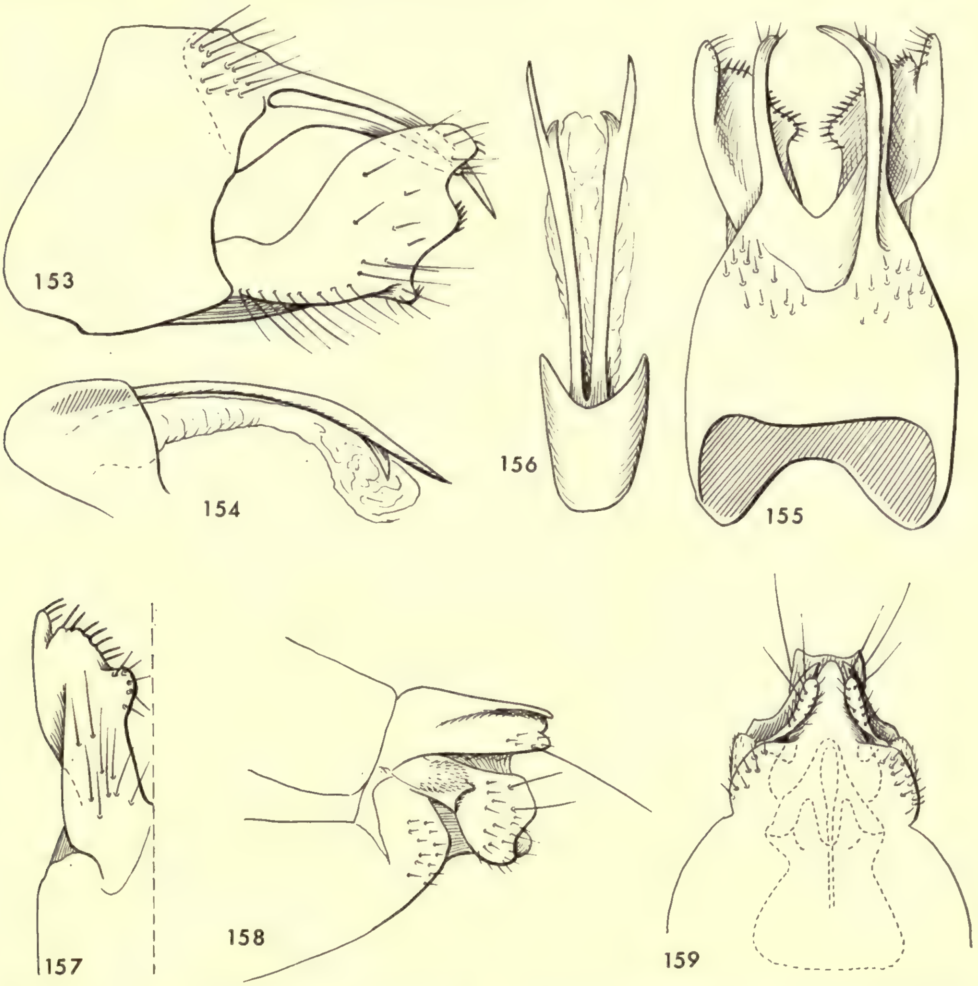
♂ (pinned). Head piceous, with piceous pubescence. Basal segment of antenna fuscous, with whitish pubescence, the remaining segments with pale, fuscous pubescence, in basal half with whitish annulations. Palpi fuscous. Thorax piceous, legs pale fuscous. Wings narrow, fore wing with dense, dark chocolate (? in life black) pubescence, a conspicuous streak of snow-white pubescence running from the costal margin across the middle of the discoidal cell to the apex of the thyridial cell. In the apical area of the wing, the membrane is sprinkled with snow-white hairs and there is a suggestion of another smaller white band at the level of the thyridial cell. Hind wing with sparse, fuscous pubescence.



Figs. 150–152. *Leptocerus burmanus* sp. n. ♂. 150, genitalia, lateral ; 151, dorsal ; 152, ninth segment, claspers and aedeagus, ventral.

♂ Genitalia. Ninth and tenth tergites fused. The median lobe of the latter is long and spiniform, arising asymmetrically from the left half of the tergite, curving gently downward. Lateral lobes also spiniform, nearly as long as median lobe, but less sclerotized and terminating in a few bristles. Two areas of setae at the lateral lobes may represent the cerci. Aedeagus with a cup-like base, from which arise two spiniform parameres with bifid apices and with a digitate, membranous structure between them. Claspers fused basally, in side view narrow at base, dilating to a broad apex with a sinuous margin armed with stout setae. From below, the apical margin is obliquely sinuous.

♀ Genitalia. Apical margin of eighth sternite more sclerotized, forming a short, transverse lobe with rounded lateral margins, and with the centre of its apical margin further produced in a triangular lobe. Ninth and tenth tergites fused, making a rectangular hood. Lateral gona-



Figs. 153–159. *Leptocerus cherrensis* sp. n. 153, ♂ genitalia, lateral ; 154, ♂ aedeagus, lateral ; 155, ♂ genitalia, dorsal ; 156, ♂ aedeagus, dorsal ; 157, ♂ left clasper, ventral ; 158, ♀ genitalia, lateral ; 159, ♀ ventral.

pophyses narrow basally, dilating to an irregularly clavate apex in side view. At their bases is a slightly dilated, membranous lobe. Lower margin of gonapophyses incurved.

Length of fore wing, ♂, 6 mm., ♀, 5 mm.

Holotype ♂ (pinned, abdomen and one pair of wings mounted as microscope preparations), INDIA : Assam, Cherrapunji, BMNH.

Allotype ♀ (pinned, abdomen in glycerine), same data, BMNH.

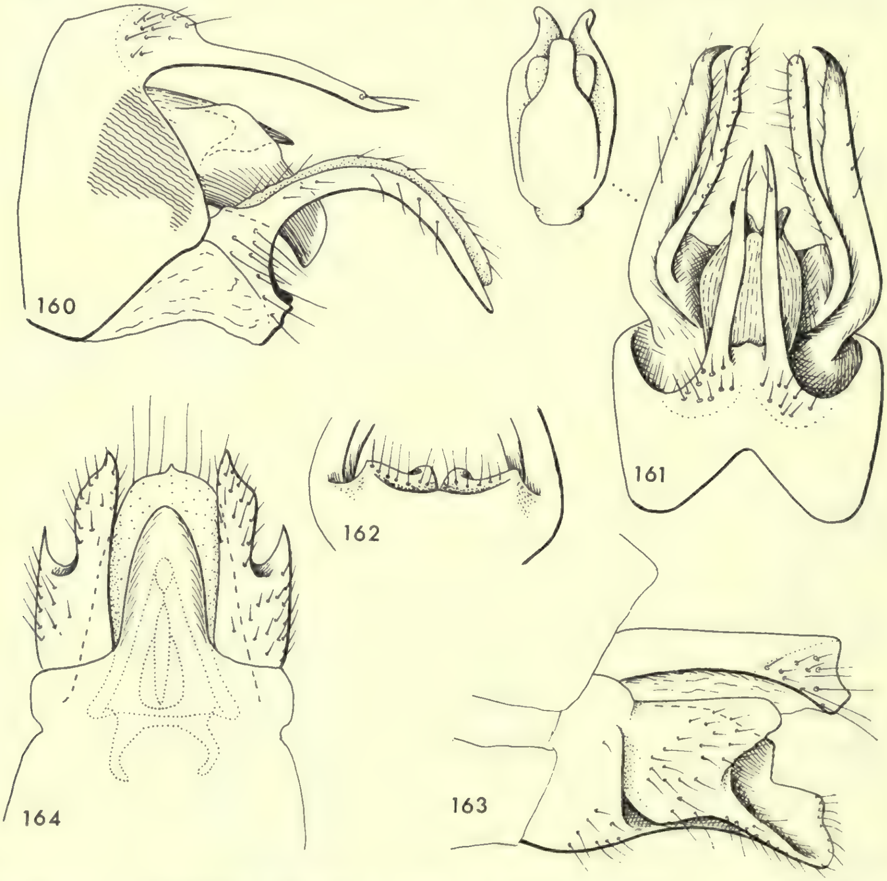
Paratypes, pinned, same data, 23 ♂, 1 ♀, BMNH.

I know of no close relative of this species. The wing markings recall the *neavei*-group of African *Leptocerus*, but the genitalia are entirely different.

Leptocerus bosei **sp. n.**

(Text-figs. 149, 160–164)

♂ (pinned). Head piceous, with piceous hairs above and whitish hairs on face. Antennae fuscous, legs fuscous with whitish pubescence. Membrane of fore wing fuscous, clothed with



FIGS. 160–164. *Leptocerus bosei* sp. n. 160, ♂ genitalia, lateral ; 161, ♂ dorsal, with inset of aedeagus ; 162, ♂ base of claspers, ventral ; 163, ♀ genitalia, lateral ; 164, ♀ ventral.

dark fuscous pubescence, a snow-white area on costal margin over the sc–r_1 and r_1–r_2 cross-veins, extending into the discoidal cell, and another, smaller spot across *Rs* about midway between the forks of *M* and *Rs*. Hind wing membrane pale fuscous, with sparse, dark fuscous pubescence.

♂ GENITALIA. Ninth segment rather short dorsally, well developed laterally, ventral apical margin excavated and linked to basal margin of claspers by membrane, the claspers being hinged to ninth segment by their upper basal angles. Tenth tergite fused to ninth, short, produced apically in a pair of long, slender, subparallel spines. At their bases, the dorsal surface of the segment bears two areas of short setae. Aedeagus short, stout, its upper surface produced in a thin, spatulate median lobe, lower part of aedeagus trough-shaped, terminating in a pair of divergent lobes. Claspers with short, wide, fused bases, the area between the upper and lower apical margins impressed, upper margin with two rounded lobes mesally, separated by an excision. Upper margin of clasper produced in two long, slender, curved, parallel processes, the outer more acute apically and more sclerotized than the inner.

♀ GENITALIA. Apical margin of eighth sternite more sclerotized, forming a broad, transverse subgenital plate, the centre of whose apical margin is further extended in a narrow, parabolic lobe, about twice as long as basal part of subgenital plate. Ninth and tenth tergites fused to form an elongate hood, whose apical margin in ventral view is produced in a small cusp. Lateral gonapophyses large. Upper surface with a deep trough between the produced upper apical angle and the raised inner margin, which projects beyond the upper margin.

Length of fore wing, ♂, 6·5 mm., ♀, 6 mm.

Holotype ♂ (pinned, one pair of wings and abdomen mounted as microscope preparations), INDIA : Jubblepore, 15.ii.1946, (*B. B. Bose*), BMNH.

Allotype ♀ (pinned, abdomen in glycerine), same data, BMNH.

Paratypes (pinned), same data, 2 ♀, BMNH.

The parallel, curved branches of the male clasper are unlike any other *Leptocerus* species known to me and should make the species easily recognisable. The female genitalia in general pattern resemble those of *L. cherrensis*, especially in the fused ninth and tenth tergites and the produced apical margin of the subgenital plate. The base of the subgenital plate is shorter in relation to its length and the lateral gonapophyses are more developed.

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CHARLES P. ALEXANDER

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ENTOMOLOGY VOL. 14 No. 7
LONDON: 1963

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BRITISH MUSEUM NATURAL HISTORY

BY

CHARLES P. ALEXANDER
Amherst, Massachusetts

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SOME TIPULIDAE FROM TIBET AND UPPER BURMA IN THE BRITISH MUSEUM (NATURAL HISTORY) (DIPTERA)

By CHARLES P. ALEXANDER

SYNOPSIS

The present report is based chiefly on collections of Tipulidae made by Frank Kingdon-Ward and Ronald J. H. Kaulback in Northeastern India, Burma and Southeastern Tibet between 1931 and 1936. A few further species from Tibet and Pakistan are included. Fifteen species are defined as new.

WHILE engaged in general and botanical explorations in northeastern India, Burma and southeastern Tibet, the late Frank Kingdon-Ward and Ronald J. H. Kaulback collected and sent to the British Museum (Natural History) numerous specimens of insects, including various species of Tipulidae. The late Fred. W. Edwards, outstanding authority on this family of flies, died in November 1940 before he was able to identify these materials and later the collection was submitted to me for study. A considerable part of the series had been determined and the specimens returned but there remained a relatively small number of species that now have been identified and are discussed at this time. All holotype specimens and named representatives of other species have been returned for preservation in the British Museum. I am greatly indebted to the Museum authorities for the opportunity of studying these specimens from an unusually desirable part of southeastern Asia.

Kingdon-Ward, accompanied by Lord Cranbrook, collected in Upper Burma, and particularly in the Adung Valley, throughout 1931, and published a detailed account of the expedition (Ward, 1937, in list of References). In 1933, he explored southeastern Tibet, in company with Ronald Kaulback (Ward, 1934). Between April 1935 and December 1936, Kaulback, accompanied by John Hanbury-Tracy, revisited southeastern Tibet while endeavouring to trace the source of the Salween River and in both 1935 and 1936 collected various insect specimens (Kaulback, 1939). The accompanying list of references cites works and papers that concern these three expeditions and previously published articles on the Tipulidae. The volumes by Ward and Kaulback contain a wealth of information concerning this region and may be consulted by interested parties.

TIPULINAE

Ctenacroscelis luteistigmatus sp. n.

Belongs to the *brobdignagius* group ; mesonotal praescutum light brown, with two intermediate brown stripes that are separated by a broader yellowish grey central vitta ; pleura obscure yellow with a narrow pale brown dorsal stripe ; femora yellow, tips narrowly and inconspicuously darkened ; claws with a single rounded tubercle ; wings weakly darkened, restrictedly patterned with darker brown, stigma conspicuously light yellow ; abdominal tergites light brown, sternites yellow ; male hypopygium with outer dististyle triangular, strongly narrowed to the subacute tip ; inner dististyle strongly expanded at basal third, apex bidentate ; eighth sternite with the posterior border gently convex, with long brownish yellow setae that do not form brushes.

Male. Length, about 28 mm.; wing, 30 mm.; antenna about 3·3 mm.

Frontal prolongation of head yellow above, weakly infuscated on sides of lower half, nasus elongate ; palpi light brown, incisures pale, tip of terminal segment blackened. Antennae with scape brown, paler beneath ; remainder of organ light brown, the outer two or three segments dark brown ; lower face of segments slightly produced, verticils short. Head brown, orbits narrowly pale ; small pale spots adjoining eye behind the rounded vertical tubercle.

Pronotal scutum light brown, slightly darker in front, sides of scutellum yellowed. Mesonotal praescutum with ground light brown ; two intermediate rich brown stripes separated by a broader yellowish grey central vitta, sublateral stripes more solidly brownish grey, lateral stripes yellowish brown ; posterior sclerites of notum chiefly light brown ; central region of scutum with the posterior and lateral borders of mediotergite more yellowed. Pleura obscure yellow, vaguely and narrowly lined dorsally with pale brown on extreme margin of mesepisternum. Halteres with stem brown, knob slightly darker, base of stem restrictedly yellowed. Legs with coxae yellow, fore pair weakly darkened in front ; trochanters yellow ; femora yellow, tips narrowly and inconspicuously darkened, tibiae and tarsi light brown ; last tarsal segment with a conspicuous epicondyle ; claw with a single rounded tubercle. Wings weakly darkened, costal border slightly more so ; narrow darker brown seams at *m–cu* and outer end of cell 1*st* M_2 ; stigma conspicuously light yellow ; veins light brown. Veins behind *C* unusually glabrous. Venation : Petiole of cell M_1 a little longer than *m* ; *m–cu* at near two-thirds M_{3+4}.

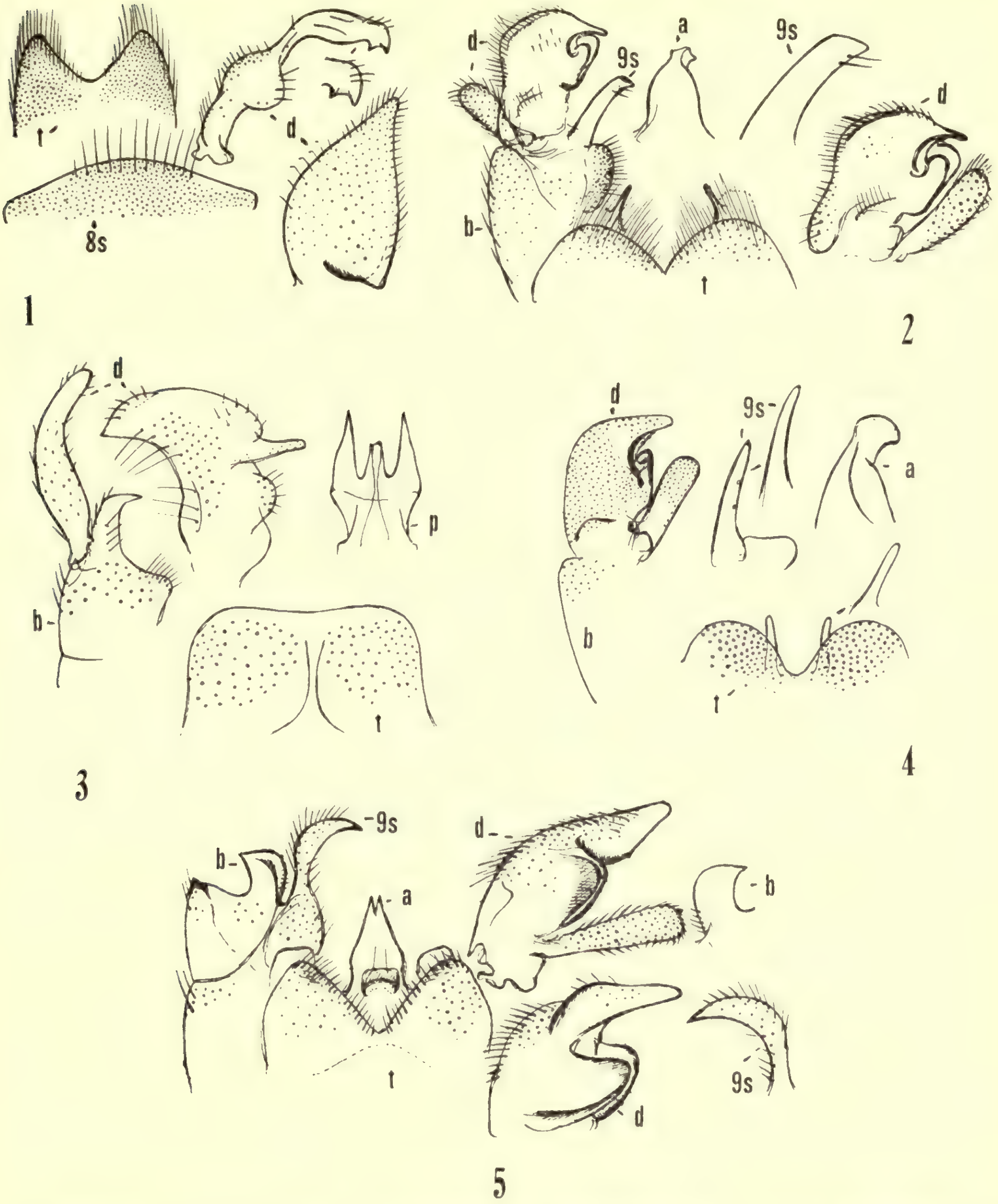
Abdominal tergites light brown, sternites yellow ; eighth sternite light brown, the base and apex more yellowed. Male hypopygium (Text-fig. 1) with the tergite, *t*, only slightly narrowed outwardly, posterior border with a V-shaped notch, lobes relatively narrow, tips obtuse ; midline narrowly glabrous, lobes with abundant yellow setae, the outer ones elongate. Outer dististyle, *d*, triangular, strongly narrowed to the subacute tip, the length about one-third greater than the width. Inner dististyle at near basal third strongly expanded, especially beneath, narrowed at midlength, the elongate outer end with relatively few setae, apex bidentate. Eighth sternite, 8*s*, with posterior border gently convex, with long brownish yellow setae, longer on the midregion but not forming brushes.

Holotype, ♂, BURMA : Hkamti Plain, 1,500 ft., 15.x.1933 (*R. J. H. Kaulback*).

Ctenacroscelis luteistigmatus is readily told from other members of the *brobdignagius* group by the yellowed wing stigma and the structure of the male hypopygium, particularly both dististyles and the eighth sternite. *C. albicostigma* Alexander, of Malaya, has the wing pattern somewhat the same but differs conspicuously in body and leg coloration and in structure of the hypopygium.

***Tipula (Vestiplex) adungensis* sp. n.**

General coloration of praescutum light grey with four narrow darker grey stripes that are conspicuously bordered by dark brown, posterior sclerites of notum with a darker brown central line ; femora yellow, tips broadly brownish black ; male hypopygium with dorsal tergal lobes obtusely rounded, with long delicate setae, ventral plate produced into a slender spine ; basistyle unarmed ; appendage of ninth sternite a flattened yellow blade, its apex obliquely truncate ; inner dististyle with beak slender.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FIGS. 1–5. (TIPULINAE). 1, *Ctenacroscelis luteistigmatus* sp. n. ; male hypopygium. 2, *Tipula* (*Vestiplex*) *adungensis* sp. n. ; male hypopogium. 3, *Tipula* (*Vestiplex*) *alyxis* sp. n. ; male hypopygium. 4, *Tipula* (*Vestiplex*) *rongtoensis* sp. n. ; male hypopygium. 5, *Tipula* (*Vestiplex*) *freemanana* sp. n. ; male hypopygium.

(Symbols : *a*, aedeagus ; *b*, basistyle ; *d*, dististyle ; *p*, phallosome ; *s*, sternite ; *t*, tergite.)

Male. Length, about 13 mm.; wing, 16 mm.; antenna, about 4 mm.

Female. Length, about 19–20 mm.; wing, 19 mm.

Frontal prolongation of head dark brown, grey pruinose, especially above; palpi black. Antennae with scape yellow beneath, darker pruinose and more corrugated above; pedicel testaceous yellow, flagellum black; in male basal swellings poorly developed, segments slightly longer than the verticils. Head above grey, variegated by brown, including a central stripe on vertex, front more silvery; vertical tubercle low.

Pronotal scutum buffy grey, anterior border dark brown, scutellum light grey. Mesonotal praescutum with ground light grey, disk with four narrow dark grey stripes that are conspicuously bordered by dark brown, including a common central vitta; posterior sclerites of notum grey, scutal lobes patterned with brown, scutellum and mediotergite with an interrupted darker brown central line. Pleura light grey, dorsopleural region brown. Halteres with stem light brown, more yellowed at base, knob dark brown. Legs with coxae light grey; trochanters yellow; femora yellow, tips broadly brownish black; tibiae brown, tips narrowly darker; tarsi dark brown, claws small, with small basal tooth. Wings with ground light brown, variegated by slightly darker brown and cream-yellow areas; cell *C* pale brown, *Sc* clear yellow; the darker brown areas include the stigma, anterior cord, origin of *Rs* and arculus; yellowed areas beyond stigma, two in cell *M*, with others in *Cu* and the Anals; obliterative areas more whitened, the prestigmal one small, the larger one in base of cell 1*st* M_2 extended into base of cell M_3; veins light brown, more yellowed in the brightened parts. Venation: *Rs* about two and a half times *m–cu*; cell 1*st* M_2 elongate; petiole of cell M_1 subequal to or about twice the length of *m*.

Basal abdominal segments yellow, tergites with a narrow sublateral dark brown stripe, the extreme borders grey; basal sternites with darkened spots at base and at outer end, outer five segments, including hypopygium, blackened. In female, tergites conspicuously trivittate with brownish black, the broader central stripe continuous, outer sternites more pruinose. Male hypopygium (Text-fig. 2) with the dorsal tergal lobes, *t*, broadly obtuse, provided with long delicate setae; ventral arm on either side consisting of a flattened pale plate, its inner margin produced into a slender rod. Ninth sternite including a large darkened lobe with coarse erect setae; appendage, 9*s*, a flattened yellow blade, gradually narrowed outwardly, apex obliquely truncate; inner margin near tip with two long setae. Basistyle unarmed. Outer dististyle, *d*, short, darkened, apex broadly obtuse. Inner dististyle broad, beak slender, lower beak double, both blades obtuse. Aedeagus, *a*, triangular in outline, the narrowed apex decurved.

Holotype, ♂, N.E. BURMA: Adung Valley, 12,000 ft., 10.vi.1931 (*Kingdon-Ward & Lord Cranbrook*).

Allotopotype, ♀, pinned with type.

Paratopotypes, 2 ♀♀, 26–27.vi.1931, with types; 1 ♀, 9,000 ft., 6.vi.1931.

Tipula (*Vestiplex*) *adungensis* is generally similar to several other members of the *himalayensis* complex of species, differing chiefly in the structure of the male hypopygium, including especially the tergite, ninth sternite and inner dististyle. Other regional species that have the tergal setae long and delicate include *T*. (*V*.) *rongtoensis* sp. n., *T*. (*V*.) *spathacea* sp. n., and *T*. (*V*.) *zayulensis* sp. n.

Tipula (Vestiplex) alyxis sp. n.

Size relatively large (wing of male about 17 mm.); general coloration of head and thorax buffy, praescutum with four greyish brown stripes that are inconspicuously bordered by pale brown; femora yellow, gradually darkening to the brownish black tips, in cases with a scarcely indicated brightening before apex ; wings light brown, with an inconspicuous pattern of light yellow areas ; abdomen of male yellow, outer five segments black, in female more uniformly yellow, tergites trivittate with brown ; male hypopygium with posterior border of tergite transverse ; basistyle produced into a powerful blackened rod ; phallosome including the short aedeagus and longer blackened spinoid apophyses.

Male. Length, about 12–13 mm.; wing, 16–17 mm.; antenna, about 5–5·5 mm.

Female. Length, about 21–22 mm.; wing, 17–18 mm.; antenna, about 3 mm.

Frontal prolongation of head buffy yellow ; nasus elongate ; palpi light brown, terminal segment dark brown. Antennae of male relatively long ; scape and pedicel light yellow, first flagellar segment brownish yellow, succeeding segments weakly bicolored, brown, the basal enlargement black, outer five or six segments more uniformly darkened ; antennae of female shorter, the pattern generally the same. Head buffy, with a darkened central line on vertex.

Pronotum yellow. Mesonotal praescutum with the ground yellowed, with four greyish brown stripes that are narrowly and inconspicuously bordered by pale brown ; scutum yellow, lobes more reddish brown ; scutellum and postnotum testaceous yellow. Pleura testaceous yellow, the ventral sternopleurite and meron more reddish yellow ; dorsopleural membrane yellow. Halteres with stem yellow, knob dark brown. Legs with coxae and trochanters yellow ; femora yellow basally, gradually darkening outwardly, the tips narrowly brownish black ; in cases the femora slightly more yellowed before tips to form vague rings ; tibiae and tarsi brownish black to black ; claws of male toothed. Wings light brown, inconspicuously variegated by light yellow areas, including a larger poststigmal band that extends backward to cell *1st* M_2 ; other major yellow marks in cells R, M, R_1 and at near midlength of cells Cu and *1st A ;* more restricted similar areas in bases of cells M_3 and M_4, both ends of cell *2nd A*, and less evidently in outer end of cell R_5 ; prearcular and costal regions more saturated yellow ; stigma oval, slightly darker than the ground ; veins brown, more yellowed in the brightened areas. Macrotrichia lacking on all but outer ends of veins M and *2nd A*, *1st A* and basal section of Cu_1 without trichia. Venation : R_{1+2} preserved ; cell M_1 nearly twice its petiole.

Abdomen reddish yellow basally, the outer five segments in male black ; in female abdomen more uniformly yellow, tergites narrowly trivittate with brown. Ovipositor with lower margins of cerci conspicuously serrate, as common in the subgenus. Male hypopygium (Text-fig. 3) with tergite, *t*, large, approximately rectangular in outline, posterior border nearly truncate, with a weak middorsal furrow ; lobes on either side with abundant delicate setae, the outer ones smaller. Ninth sternite without a definite appendage. Basistyle, *b*, produced into a powerful rod, outwardly narrowed and curved into a blackened point ; surface with numerous setae, those of outer face longer. Outer dististyle, *d*, a flattened black blade or rod, gradually narrowed to the obtuse tip, with numerous inconspicuous pale setae. Inner dististyle as figured ; beak slender, outer crest elevated, pointed behind ; vestiture reduced in number and size of setae ; lower beak very obtuse. Phallosome, *p*, including the short aedeagus and longer blackened spines that represent the apophyses.

Holotype, ♂, S.E. TIBET : Rongtö Valley, 6,500 ft., 23.v.1933 (*Kingdon-Ward & Kaulback*).

Allotopotype, ♀, 21.v.1933.

Paratopotypes, 1 ♂, 3 ♀♀, 19–23.v.1933.

Paratypes, 1 ♂, Ata Kang La, Zayul, 10,000 ft., 16.vii.1933 ; 1 ♀, 8,000 ft., 16.vii.1933 ; 1 ♂, Rima Chu, Zayul, 6,000 ft., 20.iv.1933 (*Kingdon-Ward & Kaulback*).

While generally similar to various other regional members of the *himalayensis* group, *Tipula* (*Vestiplex*) *alyxis* is quite distinct in the structure of the male hypopygium, particularly the tergite, inner dististyle and phallosome. In general appearance it somewhat suggests *T.* (*V.*) *nigrotibialis* Brunetti (*lepcha* Alexander).

Tipula (Vestiplex) avicularia Edwards

Tipula avicularia Edwards, 1928, Ann. Mag. Nat. Hist. (10) **1** : 689–690, fig. 7 (wing).

S.E. TIBET : Rongtö Valley, Rima Chu, Zayul, 6,000 ft., 20.iv.1933 (*Kingdon-Ward & Kaulback*).

Tipula (Vestiplex) distifurca Alexander

Tipula (*Vestiplex*) *distifurca* Alexander, 1942, Rec. Indian Mus. **44** : 44–46, figs.

S.E. TIBET : Rongtö Valley (on label written " Rong Thod "), 6,000 ft., 3–5.v.1933 (*Kingdon-Ward & Kaulback*).

Tipula (Vestiplex) freemanana **sp. n.**

Mesonotal praescutum with broad greyish white borders, disk with four dark brown stripes, interspaces obscured, posterior sclerites of notum whitish grey with a central brown line ; femora brownish yellow, tips rather broadly black, claws of male simple ; wings light brown, marbled with pale yellow and slightly darker brown areas ; first abdominal tergite dull yellowish brown, succeeding four segments reddish yellow, broadly trivittate with black, outer segments black ; male hypopygium with arm of basistyle a broad cultrate black blade ; appendage of ninth sternite a flattened semicultrate blade, its tip acute, surface with unusually conspicuous yellow setae.

Male : Length, about 15·5 mm. ; wing, 17 mm.

Frontal prolongation of head, including nasus, light cinnamon brown ; palpi with first segment brown, remainder black. Antennal scape light brown, pedicel yellow, flagellum broken. Head above obscure yellow, with a narrow light brown central darkening ; beneath light grey, genae infuscated.

Pronotal scutum brown. Mesonotal praescutum broadly greyish white on sides, disk with four dark brown stripes, the median interspace obscure brownish yellow, lateral interspaces dark grey ; scutum whitish grey, each lobe with two virtually confluent dark brown areas ; scutellum and mediotergite whitish grey with a central brown line, slightly darker on mediotergite ; katapleurotergite pale brown. Pleura grey, vaguely patterned with brown on sternopleurite and dorsal anepisternum ; dorsopleural membrane light brown. Halteres with stem brownish yellow, knob brownish black. Legs with coxae grey ; trochanters testaceous yellow ; femora brownish yellow, tips rather broadly black ; tibiae and tarsi yellowish brown to light brown ; claws of male small, simple. Wings light brown, variegated by large pale yellow areas, chiefly before the cord ; stigma medium brown, with a large darkened extension over the anterior cord ; beyond stigma a major yellow area extending through cell R_5 ; whitened obliterative area before stigma small, the second area across base of cell *1st* M_2 larger, extending into cells R and M_3 ; cells C and Sc light brownish yellow ; veins pale brown, more brownish yellow in costal field. Small macrotrichia on veins R_3, R_{4+5} and outer end of M_1. Venation : Rs long, a little less than twice $m–cu$; petiole of cell M_1 subequal to m.

First abdominal tergite dull yellowish brown, succeeding four segments reddish yellow, broadly trivittate with black ; sternites darker brown ; outer segments uniformly black. Male hypopygium (Text-fig. 5) with dorsal tergal plate, *t*, large, posterior border with a deep V-shaped emargination ; lobes obtuse, bordered on inner margins with black setae of moderate length ; ventral tergal armature ill-delimited, appearing as smooth plates, on microscope slide lying above base of ninth sternite. Ninth sternite with base darkened, with long yellow setae ; appendage, 9*s*, a flattened semicultrate blade, widened on outer half, narrowed to the acute tip, surface with unusually conspicuous yellow setae. Basistyle, *b*, small, outer margin blackened but scarcely produced, the ventromesal arm a broad cultrate black blade that is connected with the appendage of the ninth sternite. Outer dististyle a dusky club, gradually narrowed outwardly, apex broadly obtuse. Inner dististyle, *d*, with apex of beak obtuse ; lower beak and plates appearing as blackened obtuse lobes. Aedeagus, *a*, broad at base, narrowed to the slightly bifid apex.

Holotype, ♂, N.E. BURMA : Adung Valley, 12,000 ft., 8.viii.1931 (*Kingdon-Ward & Lord Cranbrook*).

I take unusual pleasure in dedicating this fly to Dr. Paul Freeman, authority on the Orthorrhaphous Diptera, including the British Tipulidae. *Tipula* (*Vestiplex*) *freemanana* is generally similar to species such as *T.* (*V.*) *avicularia* Edwards, being best distinguished by the structure of the male hypopygium, particularly the tergite, ninth sternite and basistyle. The simple claws of the male are noteworthy.

Tipula (Vestiplex) himalayensis Brunetti

Tipula himalayensis Brunetti, 1911, Rec. Indian Mus. **6** : 252.
Tipula (*Vestiplex*) *subreposita* Alexander, 1942, Rec. Indian Mus. **44** : 39–41, fig. 5 (♂ hypopygium).

S.E. TIBET : Rongtö Valley, Zayul, 3,000 ft., 28.iii.1933 ; 6,000 ft., 6–12.v.1933 ; Chu Valley, Ata Kang, 7,500–8,000 ft., 27–29.v.1933 (*Kingdon-Ward & Kaulback*).

***Tipula (Vestiplex) rongtoensis* sp. n.**

Size large (wing of male 20 mm.) ; antennae relatively long ; mesonotum yellowish white, praescutum with four olive stripes that are narrowly bordered by light brown, scutellum and mediotergite with a darkened central line ; legs brownish black, claws of male small, simple ; wings light brown, patterned with darker brown and whitened areas ; macrotrichia of veins small ; abdomen buffy yellow, tergites trivittate with dark brown, outer segments blackened, eighth sternite dark, with two yellow marginal spots ; male hypopygium with tergal lobes broadly rounded, thickened, with very abundant setae, on ventral surface of each lobe with a slender glabrous rod ; appendage of ninth sternite a sclerotized rod with sparse setae ; outer dististyle with tip broadly obtuse ; inner dististyle with both the beak and lower beak well developed, the latter more sclerotized.

Male. Length, about 19 mm.; wing, 20 mm.; antenna, about 7 mm.

Frontal prolongation of head long, subequal to the remainder, greyish yellow above, including the conspicuous nasus, lower half abruptly dark brown ; palpi with first segment brown, remainder black, tips of second and third segments paler. Antennae long ; scape and pedicel yellow, first flagellar segment brown, remainder black ; flagellar segments beyond the first with basal enlargement moderately developed, verticils shorter than the segments. Head pale olive yellow, more whitened near the antennal bases ; a vague narrow brown central vitta from the low vertical tubercle onto the posterior vertex.

Pronotum olive yellow, vaguely patterned with darker. Mesonotal praescutum yellowish white with four olive stripes that are narrowly bordered by light brown, including the narrow median dividing vitta, vestiture pale ; scutum yellowed medially, lobes olive, ringed with pale brown ; scutellum darker yellow, mediotergite yellowish white, each with a nearly continuous brown central vitta. Pleura and pleurotergite pale olive yellow, variegated with darker on ventral sternopleurite ; katapleurotergite silvery white ; dorsopleural membrane very light brown. Halteres with stem obscure yellow, knob dark brown. Legs with coxae olive yellow ; trochanters yellow ; femora light brown, tips narrowly brownish black, bases narrowly more yellowed ; tibiae and tarsi dark brown ; claws small, simple. Wings with ground light brown, prearcular and costal fields more yellowed ; a slightly darker brown pattern including stigma, origin of *Rs* and anterior cord ; whitened areas include a narrow poststigmal band from costa into base of cell R_5 ; obliterative areas in cell *1st* M_2 and adjoining bases of M_3 and M_4 ; other pale areas before and beyond origin of *Rs*, near base and again near outer end of cell *M*, and more vaguely in the cubital and anal cells ; veins brown, more brownish yellow in the brightened fields. Macrotrichia of veins small, including certain longitudinal veins beyond cord, as the Medial veins except at their outer ends ; trichia on distal section of Cu_1 and outer two-thirds of *2nd A*, lacking on *Rs*, R_{2+3}, *m*, and *1st A*. Venation : *Rs* long, about two and a half times R_{2+3} ; cell M_1 about three times its petiole, the latter subequal to *m* ; *m–cu* shortly beyond base of M_4.

Abdomen with basal segment buffy yellow, succeeding segments deeper yellow, tergites narrowly darkened sublaterally, the areas becoming broader and more distinct beyond the second segment ; a broad virtually entire median dark brown tergal stripe ; basal sternites more uniformly reddish yellow ; segments from six outwards brownish black, bases of sixth and seventh yellowed ; eighth sternite with two widely separated yellow spots on posterior border. Male hypopygium (Text-fig. 4) with tergite, *t*, transverse, narrowed at midline, posterior border with a conspicuous U-shaped notch to form broad rounded lateral lobes, these more thickened, with abundant very long yellow setae from conspicuous pale punctures ; on ventral surface on either side of midline with a slender glabrous pale rod, generally similar in form but a little smaller than the appendage of the ninth sternite. Ninth sternite with a low obtuse darkened lobe provided with long coarse yellow setae, the appendage, *9s*, a sclerotized rod, broadest at base, narrowed gradually to the subacute tip, with sparse scattered setae. Outer dististyle, *d*, a flattened club, broadly obtuse at tip, darkened and with abundant setae. Inner dististyle massive, the beak relatively slender, lower beak conspicuous, the entire surface with abundant long pale setae ; near base of style with a low sclerotized flange. Aedeagus, *a*, broad across base, with incurved margins, the compressed-flattened apex slightly dilated. Eighth sternite simple.

Holotype, ♂, S.E. TIBET : Rongtö Valley, 6,000 ft., 7.v.1933 (*Kingdon-Ward & Kaulback*).

Tipula (*Vestiplex*) *rongtoensis* is quite distinct from other large-sized regional species of the subgenus in its hypopygial characters, particularly the tergite, appendage of the ninth sternite, and the dististyles. The most similar such species having similar long pale setae on the dorsal tergal lobes is *T.* (*V.*) *zayulensis* sp. n. The shape of the appendage of the ninth sternite is suggestive of that of the smaller and otherwise distinct *T.* (*V.*) *ravana* Alexander, of the western Himalayas.

***Tipula (Vestiplex) spathacea* sp. n.**

Size large (wing of male over 20 mm.) ; mesonotal praescutum light yellow, with four grey stripes that are narrowly bordered by light brown ; antennae with scape and pedicel yellow, flagellum black ; apices of knobs of halteres light yellow ; femora brownish black, without an outer yellowed ring, tibiae and tarsi brownish black, claws toothed ; wings marbled light yellow and pale brown ; basal abdominal segments light yellow, restrictedly patterned with pale brown, outer five segments brownish black ; male hypopygium with beak of inner dististyle very slender, divided into two points ; appendage of ninth sternite a very large flattened yellow blade, its outer end dilated, apex obtuse.

Male. Length, about 20 mm.; wing, 21 mm.; antenna, about 5 mm.

Frontal prolongation of head orange yellow, outer end above, including the nasus, more pruinose ; palpi with basal segments orange, remainder broken. Antennae of male relatively long ; scape yellow, pedicel clear light yellow, first flagellar segment brown, darker outwardly, remainder of flagellum black ; flagellar segments feebly incised, longer than the verticils. Head orange, disk yellow pollinose, centre of vertex and sides of genae weakly darkened.

Pronotal scutum yellow pollinose, brown anteriorly, scutellum yellow. Mesonotal praescutum with ground light yellow, disk with four grey stripes that are narrowly bordered by light brown, the median edges virtually confluent ; scutum with central area light yellow, lobes more brownish grey ; scutellum obscure yellow with a brown central line ; mediotergite light brown on sides, posterior fourth and central area yellowed ; pleurotergite brownish yellow, the katapleurotergite clear light yellow ; vestiture of praescutal interspaces and the mediotergite small, of scutellum longer, pale yellow. Pleura orange yellow, pollinose ; dorsopleural membrane light brown. Halteres with stem obscure yellow, knobs dark brown basally, tips broadly light yellow. Legs with coxae and trochanters yellow ; femora brownish black, bases narrowly yellowed, without a brightened subterminal ring ; tibiae and tarsi brownish black ; claws toothed. Wings with a marbled pattern, as common in the subgenus ; light yellow, with major pale brown clouds at arculus, origin of *Rs*, cord, beyond midlength and at end of cell *M*, and extensively in cells *Cu*, *1st A* and *2nd A*, the darkened pattern subequal in amount to the ground ; cells beyond cord pale brown with a pale yellow band extending from costa to cell R_5 ; a yellow area in cell *C* before stigma ; more whitened obliterative areas before stigma and across centre of cell *1st* M_2, this slightly involving cells *R*, M_3 and M_4 ; cells *C* and *Sc* uniformly brownish yellow ; veins brown. Small macrotrichia on veins R_3, R_{4+5}, outer medial veins and distal section of Cu_1, none on *Rs* or Anals. Venation : *Rs* long, about two and a half times *m–cu ;* petiole of cell M_1 slightly longer than *m*.

Basal four abdominal segments light yellow, tergites vaguely trivittate with pale brown, each sternite with a small darkened spot near base ; segment five brownish black, narrowly yellowed basally, more extensive on sternite ; outer segments brownish black. Male hypopygium (Text-fig. 6) with the tergite, *t*, large, dorsal plate with each lobe broadly obtuse, margins narrowly darkened and microscopically roughened, apices with very long yellow setae ; lower tergal lobes small, especially their blackened finger-like apices. Appendage of ninth sternite, 9*s*, very large, appearing as a long flattened yellow blade that is constricted before midlength, thence expanded, the apex very broadly obtuse, blade provided with a few yellow setae, exceeding in length the inner dististyle, apparently arising on extreme margin of basistyle rather than on the ninth sternite, the latter produced into a smaller lobe, its apex glabrous. Outer dististyle, *d*, about five times as long as broad, nearly parallel-sided, tip obtuse. Inner dististyle with beak very slender, divided, the longer point obtuse at tip, the slightly shorter subtending spine acute ; lower beak including two obtuse blades, directed upward to form a cup-like structure ; on face of style behind the beak with a low brown flange ; near base style produced into flattened plates. Aedeagus, *a*, broad, narrowed outwardly, terminating in a small obtuse point.

Holotype, ♂, N.E. BURMA : Adung Valley, 8,000 ft., 30.v.1931 (*Kingdon-Ward & Lord Cranbrook*).

Tipula (*Vestiplex*) *spathacea* is quite distinct from other known regional species in the unusual appendage of the ninth sternite of the male hypopygium which here is larger than in other members of the *himalayensis* group. It should be emphasized that this appendage, commonly considered to be borne by the ninth sternite, here appears to arise from the extreme margin of the basistyle rather than the sternite. Very long tergal setae, as described here, occur likewise in various other species, including *T.* (*V.*) *rongtoensis* sp. n. and *T.* (*V.*) *zayulensis* sp. n.

Tipula (Vestiplex) subscripta Edwards

Tipula subscripta Edwards, 1928, Ann. Mag. Nat. Hist. (10) **1** : 689.

The type was from Yunnan, China, taken east of Janula, 11,000 ft., 24.vi.1922, by J. W. Gregory.

S.E. TIBET : Shugden Gompa, Ngagong, 12,000–13,000 ft., 18–25.viii.1933 (*Kingdon-Ward*) ; on labels written " Shiuden Gompa ". Du Chu Valley, 13,000–13,500 ft., 13.vii.1936 (*Kaulback*) ; Posho, 13,000–14,000 ft., 24–29.vii.1936 (*Kaulback*) ; Ngagong Chu, Pome, 12,000 ft., 12.viii.1935 (*Kaulback*).

***Tipula (Vestiplex) zayulensis* sp. n.**

Allied to *rongtoensis* ; size large (wing of male about 20 mm.) ; mesonotum grey, praescutum with four stripes that are bordered by darker ; femora brown with a yellow subterminal ring ; wings medium brown, patterned with darker brown and cream-coloured areas, including a large postarcular darkening ; male hypopygium with dorsal lobes of tergite rounded, conspicuously hairy, ventral armature consisting of a narrow plate, its blackened margin microscopically serrulate ; appendage of ninth sternite glabrous ; cerci of ovipositor with smooth margins.

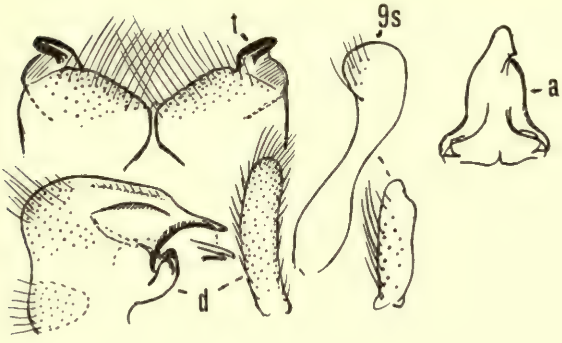
Male. Length, about 17–18 mm.; wing 20–21 mm.; antenna, about 4 mm.

Female. Length, about 29–30 mm.; wing, 23–24 mm.

Frontal prolongation of head above yellow, dusted with whitish, darker on sides ; nasus elongate ; palpi brown, terminal segment brownish black. Antennae short ; scape and pedicel yellow, first flagellar segment yellowish brown, succeeding two or three segments bicoloured, the small basal enlargements dark brown, the stems yellow, becoming progressively darker on outer segments, becoming uniformly dark brown ; segments a trifle exceeding their longest verticils. Head brownish yellow, heavily light grey pruinose, centre of posterior vertex vaguely more darkened ; vertical tubercle rounded, entire.

Pronotum light grey, vaguely patterned with light brown. Mesonotal praescutum with the restricted ground light grey, with two intermediate darker grey stripes and more brownish grey laterals, bordered by brown, the inner edges of all stripes darker than the subobsolete outer margins ; scutum light grey, each lobe with two confluent brown areas, the larger posterior one vaguely bordered by darker brown ; scutellum and mediotergite grey, with a more or less distinct central brown line. Pleura grey, the anepisternum and ventral sternopleurite darker grey ; dorsopleural membrane yellow. Halteres with stem yellow, knob dark brown, apex restrictedly obscure yellow. Legs with coxae grey ; trochanters yellow ; femora brown, more yellowed basally, tips broadly black, preceded by a clearer yellow ring ; tibiae and tarsi brown ; claws of male with an acute subbasal spine. Wings medium brown, with a restricted darker brown and more extensive pale pattern ; the dark areas include a large postarcular marking extending from costa to *Cu*, involving the bases of cells *R* and *M ;* other darkenings at origin of *Rs*, stigma and a confluent seam over anterior cord ; pale areas include the prearcular field, a large area near bases of cells *R* and *M* and other smaller marks near outer ends of these cells encroaching on adjacent cells ; beyond the cord a short but conspicuous band beyond stigma, extending from *C* through cell R_5 ; pale marginal spots in outer ends of both Anal cells ; obliterative area across base of cell *1st* M_2, including also parts of cells *R* and M_3 ; pale prestigmal spot very small ; veins light brown. Outer longitudinal veins with macrotrichia, lacking on *Rs*, *M*, all sections of M_{1+2}, M_{3+4} and basal section of M_3 ; vein *1st A* with one or few trichia at end, *2nd A* with a series on outer half ; no trichia on prearcular Anal veins. Venation : *Rs* from one-half to about three-fourths longer than *m–cu ;* petiole of cell M_1, subequal to or shorter than *m*.

First abdominal tergite buffy, darkened medially on posterior half ; tergites two to five yellow, trivittate with dark brown, the sublateral darkenings interrupted at posterior ends of segments, extreme lateral borders clearer grey ; basal sternites yellow, lateral borders grey ; outer segments passing into brownish black, styli of hypopygium brownish yellow ; in a paratype male, the basal abdominal segments are almost uniformly orange yellow, the dark pattern obsolete or virtually so. Ovipositor with margins of cerci smooth, without serrations, on basal half fringed with delicate setae ; hypovalvae relatively long, compressed-flattened.



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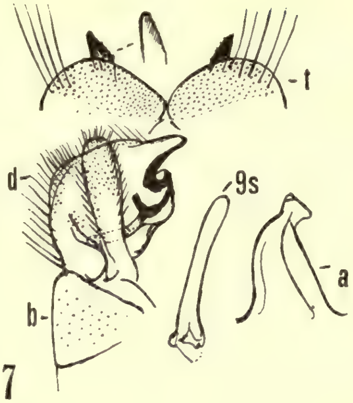

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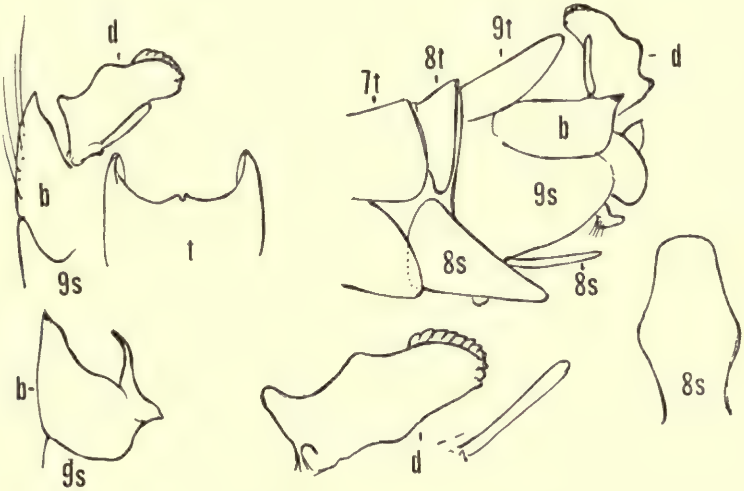
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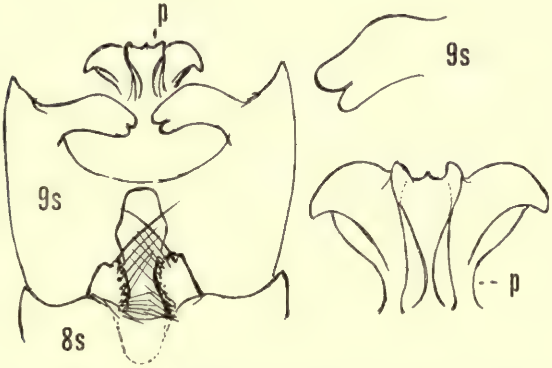

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FIGS. 6–9. (TIPULINAE). 6, *Tipula* (*Vestiplex*) *spathacea* sp. n. ; male hypopygium. 7, *Tipula* (*Vestiplex*) *zayulensis* sp. n. ; male hypopygium. 8, 9, *Tipula* (*Lunatipula*) ***barnesiana*** sp. n. ; male hypopygium.
(Symbols : *b*, basistyle ; *d*, dististyle ; *p*, phallosome ; *s*, sternite ; *t*, tergite.)

Male hypopygium (Text-fig. 7) with upper lobes of tergite, *t*, very low and obtuse, the median emargination shallow ; lobes with very long pale erect setae, directed dorsad ; ventral tergal armature consisting of small narrow plates, the mesal edge blackened and microscopically serrulate. Ninth sternite, *9s*, with long setae, the appendage a narrow flattened blade, tip obtuse, surface glabrous. Basistyle, *b*, without apical spines. Outer dististyle, *d*, relatively narrow, its length about five times the width, apex obtuse. Inner dististyle compact, the beak and lower beak separated by a small circular emargination, the border heavily blackened ; a low dorsal crest ; outer surface of style fringed with very long pale setae. Aedeagus, ***a***, simple, broad-based, narrowed outwardly to a small flattened head.

Holotype, ♂, S.E. TIBET : Ata Kang, 8,000 ft., 29.v.1933 (*Kingdon-Ward & Kaulback*).

Allotype, ♀, S.E. TIBET : Zayul, 8,000 ft., 3.vi.1933 (*Kingdon-Ward & Kaulback*).

Paratypes, 1 ♂, 1 ♀, with the allotype ; 1 ♂, 1 ♀, Lepa, Zayul, 10,000 ft., 2.vii.1935 (*Kaulback*) ; Lepa Chu Valley, 12,000 ft., 6.vii.1935 (*Kaulback*).

Tipula (*Vestiplex*) *zayulensis* is most similar to *T.* (*V.*) *rongtoensis* sp. n., which has the general structure of the male hypopygium much the same, including the unusually hairy tergal lobes. The two flies differ evidently in the nature of the ventral tergal armature, appendage of the ninth sternite, and the inner dististyle. The smaller *T.* (*V.*) *ravana* Alexander, of the western Himalaya, likewise is generally similar. It is probable that the female of *T.* (*V.*) *rongtoensis* likewise will be found to have smooth-margined cerci as in the present fly.

***Tipula (Lunatipula) barnesiana* sp. n.**

Belongs to the *variipetiolaris* group ; size large (wing of male 25 mm.) ; mesonotal praescutum with the interspaces light grey, disk with four darker grey stripes that are bordered by darker brown ; nasus lacking ; wings light brown, variegated by whitened areas, chiefly at and beyond the cord ; male hypopygium with tergite tridentate ; region of ninth sternite produced into a powerful arm on either side, its apex bilobed ; phallosome depressed-flattened ; eighth sternite with conspicuous setiferous lobes, beneath with a depressed-flattened tongue.

Male. Length, about 24 mm.; wing, 25 mm.; antenna, about 5·2 mm.

Frontal prolongation of head grey above, light brown beneath ; nasus lacking ; first segment of palpus brown, remainder black. Antennae relatively long ; scape and pedicel yellow, first flagellar segment brownish yellow, remainder of flagellum black ; basal enlargements of segments small, verticils long and conspicuous. Head above nearly glabrous, light grey, with a narrow central dark line from the low vertical tubercle almost to the occiput ; genae more infuscated, provided with long black setae.

Pronotal scutum light brown, scutellum more testaceous yellow. Mesonotal praescutum with interspaces light grey, disk with four darker grey stripes, the intermediate pair bordered by darker brown to form a median vitta on anterior two-thirds of sclerite ; sublateral stripes more uniformly brown, lateral borders before suture still darker ; posterior sclerites of notum brownish grey, scutal lobes light brown ; scutellum and mediotergite more or less patterned with brown, pleurotergite light brown, more pruinose below ; vestiture of praescutal interspaces short, of scutellum and mediotergite longer, yellow. Pleura light brown, dorsopleural membrane more buffy. Halteres brownish yellow, knob dark brown, apex a little paler. Legs with coxae brownish grey ; trochanters yellow ; femora brownish yellow, tips scarcely darkened ; tibiae brownish yellow, tips very narrowly infuscated, tarsi passing into black, terminal segment brownish yellow ; claws small, toothed. Wings with ground light brown, costal border and cells beyond cord somewhat darker brown ; a conspicuous white pattern chiefly at and beyond the cord, the principal area from outer end of cell *R*, crossing cell *1st* M_2, reaching the margin in cells M_3 and M_4 ; other whitened areas beyond stigma, near outer end of cell R_5 and near base of cell *2nd* M_2 ; a whitened seam along vein *1st A*, near its outer end including also cell *Cu ;* a further whitened streak near margin of cell *1st A* closer to vein *2nd A* ; stigma and a restricted area at anterior cord slightly darker brown ; veins brown, slightly yellowish brown in the whitened areas. Longitudinal veins beyond cord with macrotrichia, lacking on outer half of R_{1+2}, *Rs*, *M* and basal section of Cu_1, sparse and scattered on outer ends of both Anal veins. Venation : R_{1+2} preserved ; R_2 relatively long, about three-fourths *r–m* ; cell *1st* M_2 elongate, basal section of M_3 about one-half longer than *m ;* cell M_1 from about one and a half to nearly twice its petiole.

Abdominal tergites brownish yellow, with a poorly indicated light brown middorsal stripe, interrupted at posterior margins of the segments, and darker brown sublateral stripes, the outer lateral margins of tergites grey pruinose ; sternites brownish yellow, a little darker medially ; outer segments, including hypopygium, more yellowish brown. Male hypopygium (Text-figs. 8, 9) with tergite, sternite and basistyle all completely separated by sutures. Ninth tergite, *t*, with posterior border broadly emarginate ; lateral angles produced into flattened blades, median area slightly produced, divided medially by a microscopic notch. Region of ninth sternite, *9s*, on either side produced mesad into a powerful arm that is directed toward the midline, apex bilobed, blackened. Outer dististyle, *d*, cylindrical, with short setae. Inner dististyle a powerful darkened blade ; beaks very short, obtuse ; dorsal crest lying far distad, low, strongly furrowed and corrugated ; region of outer basal lobe produced into a lobe, with a lower projection farther distad. Phallosome, *p*, a very conspicuous depressed-flattened structure with lateral blades and more dorsal flanges, as figured. Eighth sternite, *8s*, large, narrowed outwardly, posterior border with a U-shaped emargination filled with pale membrane ; lateral lobes semi-detached, with conspicuous setae, the most lateral longer and subfasciculate ; from base of emargination, between the eighth and ninth sternites, a conspicuous depressed-flattened tongue, its apex very obtuse, slightly dilated at near midlength.

Holotype, ♂, S.E. TIBET : Zayul, 14,000 ft., 30.viii.1935 (*Kaulback*).

The species is dedicated to the late Dr. H. F. Barnes, authority on the Cecidomyiidae, who made important studies on the crane-flies of Caernarvonshire, north Wales. The fly is one of a group of four known species, all from the high mountains of western China and the Tibetan border, the others being *Tipula* (*Lunatipula*) *justa* Alexander, 1935, from Szechwan, western China, altitude 15,200 ft., taken August 14, 1933, by Graham ; *T.* (*L.*) *minensis* Alexander, 1934, from Minshan, Kansu, western China, altitude 3,000 metres, taken July 20, 1930, by Hummel, and *T.* (*L.*) *variipetiolaris* Alexander, 1933, from the China-Tibet border, altitude 14,000 ft., taken August 14, 1930, by Graham. All of these species are readily distinguished by conspicuous hypopygial differences, including especially the tergite, dististyles, phallosome, and the eighth and ninth sternites. The *variipetiolaris* group was proposed by the writer in 1935 and has been placed in the subgenus *Lunatipula* where it disagrees especially in the naked squamae. The wing pattern is suggestive of certain species of *Acutipula* but the group does not belong here and eventually a new subgenus may be required for the reception of the species.

***Nephrotoma dutti* sp. n.**

Mesonotal praescutum with three polished ferruginous stripes, pleura yellow, variegated with more ferruginous areas ; legs brownish yellow, tarsi passing into brown ; wings very pale yellow, costal border more saturated yellow ; stigma medium brown, with trichia, cell M_1 sessile ; abdomen brownish orange, with a broad brownish black subterminal ring ; male hypopygium with tergal lobes rounded, with abundant spicules, the lateral ends produced into a strong curved arm ; inner dististyle massive, region of dorsal crest produced into a low triangular point ; gonapophyses elongate-oval, shorter than the aedeagus.

Male. Length, about 13–14 mm.; wing, 10·5–12·5 mm.; antenna, about 4·8–5 mm.

Female. Length, about 14 mm.; wing, 12 mm.

Frontal prolongation of head light yellow, outer half of dorsum, with the long nasus, infuscated ; palpi yellow throughout. Antennae with scape light yellow, pedicel more testaceous yellow, flagellum black ; flagellar segments in male strongly incised, the outer enlargements longer than the basal swellings, segments exceeding their verticils. Head light orange yellow, posterior vertex with a very delicate brown median line that does not reach the occiput, the occipital brand barely differentiated ; vertical tubercle prominent, weakly divided medially ; vestiture of vertex small, black.

Pronotum uniformly light yellow. Mesonotal praescutum polished yellow with three polished ferruginous stripes, the centre of the median area vaguely paler, lateral stripes straight ; scutum yellow, each lobe with two nearly confluent ferruginous areas ; scutellum very slightly darkened, parascutella yellow ; postnotum, including pleurotergite, yellow, mediotergite with posterior third vaguely more ferruginous ; vestiture of thoracic notum very small and sparse, best indicated on scutellum and mediotergite. Pleura yellow, variegated with more ferruginous areas on anepisternum, ventral sternopleurite and ventral meron. Halteres with stem yellow, knob infuscated. Legs with coxae and trochanters yellow ; femora and tibiae brownish yellow, tips of latter narrowly darkened ; tarsi passing into brown. Wings (Text-fig. 10) very pale yellow, prearcular and costal fields slightly more saturated yellow ; stigma medium brown ; a vague pale brown cloud on anterior cord ; veins brown, more yellowed in the brightened areas. Stigma with rather numerous macrotrichia. Venation : cell M_1 narrowly to broadly sessile ; *m–cu* at or just before fork of M_4.

Abdomen brownish orange, tergites slightly more darkened medially, the actual borders pale ; sternites more uniformly orange yellow ; seventh and eighth segments brownish black to form a conspicuous ring ; hypopygium yellowed. In female, abdomen obscure orange yellow with a central brown stripe, seventh and eighth segments blackened. Ovipositor with genital shield and cerci yellow, tips of the latter narrowly obtuse. Male hypopygium (Text-fig. 14) with the tergite, *t*, transverse, posterior border shallowly emarginate, with low broad darkened lobes that bear abundant blackened spicules, those on cephalic margin longer and more concentrated ; outer lateral end of each lobe produced into a strong curved arm, its apex with a few further spicules. Outer dististyle, *d*, expanded beyond base, narrowed to the obtuse tip, the length is little less than three times the greatest width. Inner style massive, beak obtuse, its lower part heavily blackened, produced into an acute point ; lower beak blackened, broadly obtuse ; region of dorsal crest produced into a triangular point, concolorous with the remainder of style, not appearing as pale membrane as in many species ; no well-developed outer basal lobe, the area provided with a few strong setae. Phallosome, *p*, with gonapophyses elongate-oval, with both ends obtuse, shorter than the aedeagus. Eighth sternite large, posterior border feebly convex to subtruncate, median area filled with pale membrane, provided with relatively few strong setae of moderate length.

Holotype, ♂, PAKISTAN : Murree, 7,500 ft., 18.vi. (*Dutt*).

Allotopotype, ♀, same data.

Paratopotype, ♀, same data.

Paratype, ♂, KUMAON : Tungnath, Pauri Garhwal, 9,000 ft., 1.vi.1958 (*Schmid*). Edwards indicated that there was a further male in the British Museum (Natural History).

The specific name, *Nephrotoma dutti*, was suggested by Edwards, in honour of the collector of the type. The ferruginous praescutal stripes distinguish the fly from other regional members of the genus with the exception of the otherwise very different *N. concolorithorax* (Brunetti). It much resembles the widespread North American *N. ferruginea* (Fabricius) but is entirely different in the hypopygial structures. I am including this species in the present paper in order to complete the record of the present series of specimens from the British Museum.

Nephrotoma perhorrida Alexander

Nephrotoma perhorrida Alexander, 1942, Rec. Indian Mus. **44** : 50–52, fig. 10 (venation, ♂ hypopygium).

The types were from Cherrapunji, Assam, 4,000 ft., taken by Sircar. A metatype from the type locality, taken June 18, 1918, was presented to the British Museum by T. B. Fletcher, B.M. 1925–546.

LIMONIINAE

Limonia (Limonia) propior **sp. n.**

Mesonotal praescutum obscure yellow, with six brown stripes including the lateral borders ; femora yellow, tips brownish black, subterminal ring yellow ; wings pale yellow, marbled with extensive pale brown clouds, stigma solidly darkened ; *m–cu* before fork of *M* ; abdomen brown, posterior borders of segments, especially the sternites, yellow.

Female. Length, about 7·5–9·5 mm.; wing, 11–13 mm.

Rostrum and palpi black. Antennae with scape black, pedicel brown, more yellowed in paratype ; flagellum dark brown, segments longer than the verticils. Head dark brown, with black setae ; anterior vertex about two and a half times the diameter of scape.

Pronotum light brown, more yellowed on sides. Mesonotal praescutum obscure yellow, with six brown stripes including the lateral borders ; intermediate stripes very narrowly separated by a capillary obscure yellow median vitta ; in the paratype the lateral borders are only slightly darkened so the praescutum appears quadrivittate ; scutum broadly pale yellow medially, lobes dark brown, connected across the suture with the sublateral praescutal stripes ; scutellum and postnotum dark liver brown. Pleura and pleurotergite liver brown. Halteres with stem and apex of knob yellowed, base of latter infuscated. Legs with coxae dark brown ; trochanters obscure yellow ; femora yellow basally, tips brownish black, preceded by a slightly broader yellow ring, the central part suffused with paler brown ; tibiae and basitarsi obscure yellow, tips narrowly darkened, outer tarsal segments blackened. Wings (Text-fig. 11) with the restricted ground pale yellow, marbled with extensive pale brown clouds over the whole surface, slightly more extensive than the ground ; cell *Sc* uniformly yellow, stigma solidly darkened ; veins brown. Venation : *Sc* long, Sc_2 ending about opposite one-third R_{2+3}, Sc_1 shorter, erect ; R_{1+2} subequal to *m–cu ;* cell 1*st* M_2 subequal to distal section of vein M_3 ; *m–cu* some distance before fork of *M*, in the type the distance subequal to *m–cu*, in the paratype about one-third this length.

Abdominal tergites brown, the posterior borders of the intermediate segments narrowly and vaguely pale ; sternites conspicuously bicoloured, dimidiate, bases brown, apices broadly yellow, on sternites five to seven the pale borders narrowly more obscure yellow. Ovipositor with cerci small, very slender, tips acute ; hypovalvae broad, light yellow, tips acute.

Holotype, ♀, S.E. TIBET : Zayul, Di Chu Valley, 12,000 ft., 25.viii.1933 (*Kingdon-Ward & Kaulback*).

Paratype, ♀, N.E. BURMA : Adung Valley, 28.ix.1931 (*Kingdon-Ward & Lord Cranbrook*).

In its general appearance, especially the coloration of the wings and legs, the present fly resembles *Limonia* (*Limonia*) *kashmirica* (Edwards), widespread over the Himalayan region into western China. It differs especially in the thoracic and abdominal coloration and in the venation. In *kashmirica m-cu* lies far beyond the fork of M, at near one-third to one-half the length of cell *1st* M_2.

Limonia (Limonia) vajra Alexander

Limonia (*Limonia*) *vajra* Alexander, 1957, Jour. N.Y. Ent. Soc. **65** : 152–153.

The types were from Simbhanjang Pass, Nepal, altitude 8,190 ft., collected in July and October 1956 by Edward I. Coher. Known also from Manipur, Hkayam Boum, altitude 7,500 ft., taken June 20, 1960, by Fernand Schmid.

N.E. BURMA : Adung Valley, 8,000 ft., 12.vi.1931 (*Kingdon-Ward & Lord Cranbrook*).

The single female agrees closely with the types with the exception of the leg coloration, the darkened femoral ring being so pale and reduced in size as to virtually be lacking.

Limonia (Libnotes) kaulbackiana **sp. n.**

Size large (wing of male about 28 mm.) ; general coloration of thorax yellow, praescutum with four brown stripes, the intermediate pair narrowly separated ; halteres light yellow, knob dark brown ; legs very long, femora yellow, tips weakly infuscated ; wings yellowed, very restrictedly patterned with brown, appearing as narrow seams over cord and outer veins ; a supernumerary cross-vein in cell R_3 ; abdomen yellow with a brownish black subterminal ring.

Male. Length, about 18 mm.; wing, about 28 mm. Fore leg, femur, 22 mm.; tibia, 26 mm., tarsus, 22 mm. Middle leg, femur, 22 mm.; tibia, 23·5 mm.; tarsus, 12 mm. Hind leg, femur, 24 mm.; tibia, 25 mm.; tarsus, 14 mm.

Rostrum moderately long, exceeding the antennal scape, dark brown above, paler brown beneath ; maxillary palpi short, light brown. Antennae with scape and pedicel light brown, flagellar segments brown basally, apices obscure yellow, narrowed basally, gradually widened outwardly, with short verticils at the broadest part ; terminal segment about one-fourth longer than the penultimate. Head yellow pollinose, posterior vertex restricted, weakly darkened medially.

Pronotum light yellow medially, weakly darkened on sides. Mesonotal praescutum yellow with four medium brown stripes, the intermediate pair long, separated by a capillary ground line, lateral stripes short and broad ; posterior sclerites of notum pale yellow, scutal lobes weakly darkened. Pleura yellow, including the dorsopleural region, without evident darker pattern excepting a small area on propleura. Halteres light yellow, knob dark brown. Legs with coxae fulvous yellow ; trochanters yellow ; femora yellow, tips broadly but weakly infuscated ; tibiae and tarsi brown ; claws conspicuously toothed, including a longer outer spine and a comb of six denticles, progressively smaller toward the base ; legs very long, as shown by the measurements, fore tarsi much longer than the others. Wings yellowed, stigma and costal border more saturated yellow, the former narrowly brown at either end ; very narrow to scarcely evident brown seams over the cord and the veins beyond ; veins yellow, light brown in the darkened seams. Venation : R_2 about two-thirds the combined R_{1+2} and free tip of Sc_2 beyond it ; supernumerary crossvein in cell R_3 variable in position, from nearly opposite R_2 to about its own length before this ; cell *1st* M_2 elongate, base of cell *2nd* M_2 at near three-fourths the length of cell *1st* M_2, *m* long, strongly angulated and weakly spurred at near one-third the length ; *m–cu* at near one-third M_{3+4} ; Anal veins converging basally, *2nd A* sinuous.

Abdomen, including hypopygium, yellow, the seventh and eighth segments brownish black, the seventh sternite slightly paler.

Holotype, ♂, UPPER BURMA : Seinghku Valley, 4,500 ft., 15.v.1935 (*Kaulback*).

I dedicate this species to the collector of the type and other interesting species in the present series of specimens, Mr. Ronald J. H. Kaulback. This large and conspicuous fly is quite distinct from other regional species of *Libnotes* that have a supernumerary crossvein in cell R_3 of the wings, including *Limonia* (*Libnotes*) *fuscinervis* (Brunetti) and *L.* (*L.*) *transversalis* (de Meijere). In its nearly unpatterned wings it is more like the latter species, a much smaller fly described from eastern Java. Other very large species known from Formosa and Japan that have a supernumerary crossvein in cell R_3 have a second such element in cell R_5. If the subgenus *Laosa* Edwards is to be recognized as valid it will have to include all of these various species having supernumerary crossveins in various cells of the radial field of the wing.

Limonia (Discobola) armorica Alexander

Limonia (*Discobola*) *armorica* Alexander, 1942, Rec. Indian Mus. **44** : 54.

N.E. BURMA : Adung Valley, 12,000 ft., 5–26.viii., 1.x.1931 (*Kingdon-Ward & Lord Cranbrook*) ; 4 ♂ ♀.

S.E. TIBET : Rongtö Valley, 7,000–9,000 ft., xi.1933 (*Kingdon-Ward*) ; one specimen labelled " wet night " ; 2 ♂♂.

The Tibetan specimens agree closely with material from the Adung Valley, differing in slight features of the male hypopygium, particularly the less developed tergal lobes. A single male from the Adung Valley (August 26, 1931) is unusually large but appears to be conspecific (length, about 12 mm.; wing, 14·5 mm.).

Limonia (Rhipidia) near ***synspilota*** Alexander

Limonia (*Rhipidia*) *synspilota* Alexander, 1935, Philippine Jour. Sci. **56** : 548–550, pl. 1, fig. 16 (venation), pl. 3, fig. 39 (male hypopygium).

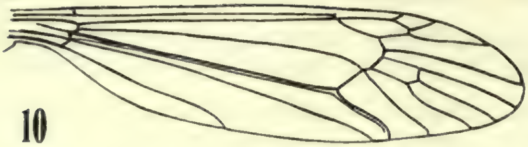
N.E. BURMA : Adung Valley, 12,000 ft., 12–16.viii.1931 (*Kingdon-Ward & Lord Cranbrook*) ; 3 ♀♀.

S.E. TIBET : Rongtö Valley, 7,000 ft., 11.xi.1933 (*Kingdon-Ward*) ; 2 ♀♀.

The females that are available are generally similar to the types, taken at various stations in Kashmir, but with the discovery of the male may possibly prove to be distinct.

***Limonia (Dicranomyia) baileyana* sp. n.**

General coloration of mesonotum greyish yellow, praescutum with a dark brown median stripe, pleura and pleurotergite yellow with a sparse white pruinosity ; head clear light grey ; wings subhyaline, stigma oval, very pale brown, Sc_1 long, about three-fourths *Rs* ; male hypopygium with posterior border of tergite truncate, with a U-shaped emargination ; basistyle with a secondary lobe on mesal face ; rostral spines very long, rostrum with a lobule at base of outer margin.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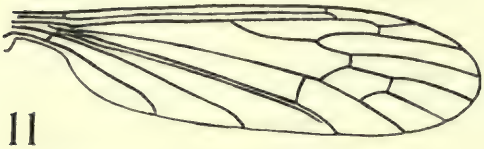
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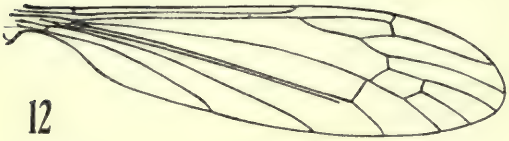
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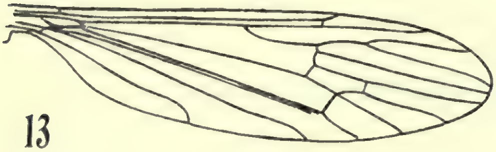
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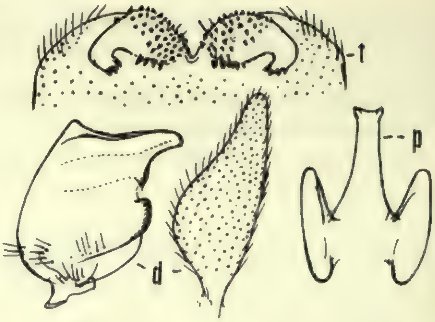
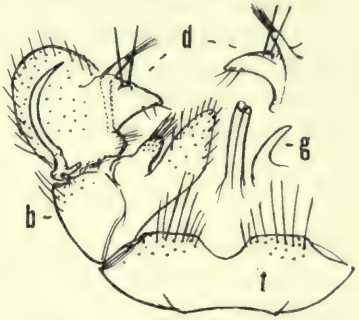


14



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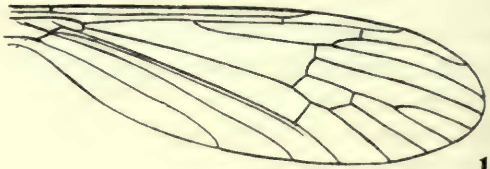
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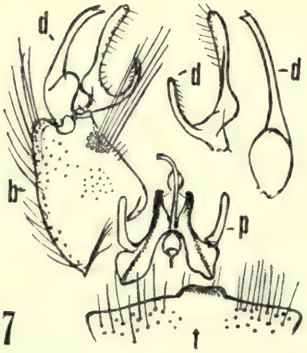

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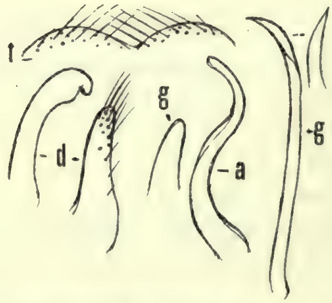

18

FIGS. 10–18. (TIPULINAE, LIMONIINAE). 10, *Nephrotoma dutti* sp. n. ; venation. 11, *Limonia* (*Limonia*) *propior* sp. n. ; venation. 12, *Limonia* (*Dicranomyia*) *baileyana* sp. n. ; venation. 13, *Phyllolabis pallidivena* sp. n. ; venation. 14, *Nephrotoma dutti* sp. n. ; male hypopygium. 15, *Limonia* (*Dicranomyia*) *baileyana* sp. n. ; male hypopygium. 16, *Limnophila* (*Prionolabis*) *kingdonwardi* sp. n. ; venation. 17, *Limnophila* (*Prionolabis*) *kingdonwardi* sp. n. ; male hypopygium. 18, *Antocha* (*Antocha*) *yatungensis* sp. n. ; male hypopygium.

(Symbols: *a*, aedeagus; *b*, basistyle; *d*, dististyle; *g*, gonapophysis; *p*, phallosome; *t*, tergite.)

Male. Length, about 7 mm.; wing, 8 mm.

Female. Length, about 6·5–7 mm.; wing, 8–8·8 mm.

Rostrum brown, palpi black. Antennae with scape and pedicel black, flagellum dark brown; flagellar segments oval, narrowed apically into short pedicels, longest verticils exceeding the segments. Head clear light grey; anterior vertex nearly two and a half times the diameter of scape.

Cervical region and median area of pronotum dark brown, sides yellowed. Mesonotal praescutum broadly greyish yellow on sides, central region dark brown, paler and vaguely divided on posterior third; scutal lobes greyish brown, median area yellowish grey; scutellum and mediotergite light brown, margins yellowed. Pleura and pleurotergite yellow, with a sparse white pruinosity. Halteres long, stem light brown, base yellowed, knob weakly more infuscated. Legs with coxae and trochanters yellow; femora yellow, tips narrowly pale brown; tibiae and tarsi light brown; claws nearly straight, with a major outer tooth, its tip obtuse, with three progressively smaller more basal denticles. Wings (Text-fig. 12) subhyaline, stigma oval, very pale brown; veins brown. Venation: Sc_1 ending opposite origin of *Rs*, Sc_1 long, about three-fourths *Rs*; R_2 in virtual transverse alignment with free tip of Sc_2; cell 1*st* M_2 subequal in length to vein M_4; *m–cu* at or just before fork of *M*.

Abdominal tergites, with the hypopygium, dark brown, basal sternites yellowed. Male hypopygium (Text-fig. 15) with tergite, *t*, narrowly transverse, posterior border truncate with a conspicuous U-shaped median emargination, the marginal setae very long. Basistyle, *b*, with setae at outer end only, ventromesal lobe elongate, broadest at near midlength, on mesal face immediately beyond the lobe with a smaller lobule tipped with long yellow setae, the apical ones stout, subfasciculate. Dorsal dististyle a curved rod, gradually narrowed into a long acute point. Ventral dististyle, *d*, slightly less in total area than the basistyle; body pale, region of rostral prolongation more darkened; prolongation yellowed, apex subacute; rostral spines very long, straight, from a low common tubercle, each spine fully one-half as long as the dorsal dististyle; on mesal face of style at base with a low lobe bearing long yellow setae, extended across base of prolongation to form a more slender lobe at base of outer margin of prolongation, tipped with long yellow setae. Gonapophysis, *g*, with mesal-apical lobe slender, gently curved. Aedeagus slender, both genital apertures terminal.

Holotype, ♂, TIBET: Chumbi Valley, 10.vi.1928 (*F. M. Bailey*).
Allotype, ♀, TIBET: Yatung, 12,000 ft., 21.ix.1928 (*Bailey*).
Paratype, ♀, TIBET: Gyantse, 13,000 ft., 13.vii.1928 (*Bailey*).

Limonia (*Dicranomyia*) *baileyana* is named after the collector, Lt. Col. F. M. Bailey, who made early collections of insects in Tibet. Other generally similar Asiatic species with modified male hypopygia include *L.* (*D.*) *vamana* Alexander, *L.* (*D.*) *veternosa* Alexander, and many others recently described by the writer from the Himalayas, all showing strong specific characters in the male hypopygium, particularly the tergite, basistyle and ventral dististyle.

Antocha (Antocha) nebulipennis immaculata Alexander

Antocha (*Antocha*) *nebulipennis immaculata* Alexander, 1938, Philippine Jour. Sci. **66**: 319, pl. 2, fig. 29 (male hypopygium).

The type was from Mount Omei, Szechwan, China, altitude 9,000 ft., taken June 12, 1937, by Tsen, a collector employed by the late George M. Franck.

N.E. BURMA: Adung Valley, 12,000 ft., 8–16.viii.1931 (*Kingdon-Ward & Lord Cranbrook*).

Antocha (Antocha) yatungensis sp. n.

Size medium (wing of male 5·5 mm.) ; general coloration of entire body yellow ; antennae and halteres yellow throughout ; femora white, tips very narrowly and abruptly black, claws with a single stout spine ; wings broad, whitish subhyaline, veins comprising the cord brown ; male hypopygium with apex of outer dististyle broadly obtuse, decurved ; aedeagus and the longer gonapophyses conspicuous, tip of latter acute.

Male. Length, about 4·5 mm. ; wing, 5·5 mm.

Rostrum and palpi pale yellow. Antennae relatively short, pale yellow throughout ; flagellar segments oval, the terminal and more proximal segments with long verticils, the remaining segments with numerous short black setae. Head light yellow.

Thorax light fulvous yellow, unpatterned. Halteres pale yellow. Legs with coxae and trochanters pale yellow ; remainder of legs long, femora white, apex very narrowly and abruptly black ; tibiae and tarsi white, outer tarsal segments weakly darkened ; claws with a single stout spine close to base. Wings broad, whitish subhyaline, veins comprising the cord and outer end of cell 1*st* M_2 brown, remaining veins whitened. Venation : R_2 sinuous, R_{1+2} only about one-third as long ; R_{2+3} about two-thirds R_2, basal section of R_{4+5} long, nearly twice *r-m ;* cell 1*st* M_2 narrowed at base, *m* about one-half longer than basal section of M_3 ; *m-cu* slightly more than its own length before fork of *M*.

Abdomen, including hypopygium, pale yellow. Male hypopygium (Text-fig. 18) with posterior border of tergite, *t*, gently emarginate, lobes rounded, with very long setae. Dististyles, *d*, terminal, outer style a gently curved glabrous blade, apex broadly obtuse, slightly decurved ; inner style narrowed to the obtuse tip, provided with long yellow setae. Aedeagus, *a*, subequal in length to the longer gonapophyses, *g*, the latter twisted before the acute apex ; shorter apophysis a pale flattened blade, apex obtuse.

Holotype, ♂, TIBET : Yatung, 10,000 ft., 10.vi.1928 (*F. M. Bailey*).

Other generally similar regional yellow species of the subgenus include *Antocha* (*Antocha*) *basivena* Alexander, *A.* (*A.*) *khasiensis* Alexander, *A.* (*A.*) *perstudiosa* Alexander, *A.* (*A.*) *scelesta* Alexander and *A.* (*A.*) *studiosa* Alexander, all differing among themselves in the coloration of the wings and femora and, especially, in the structure of the male hypopygium, including both dististyles, and phallosome. The species most similar to the present fly is *basivena*.

Phyllolabis pallidivena sp. n.

General coloration of thorax light fulvous brown ; head dark grey ; antennae relatively long, basal flagellar segments elongate, testaceous yellow ; legs yellow ; wings light fulvous, cells *C* and *Sc*, with the stigma, slightly darker, veins yellow ; *Rs* about one-third longer than R_{2+3+4} ; abdomen obscure fulvous brown ; cerci slender, margins smooth.

Female. Length, about 6·5–6·8 mm.; wing, 7·5–8·3 mm.

Rostrum and palpi brownish black. Antennae with scape brown, pedicel and proximal flagellar segments testaceous yellow, outer flagellar segments infuscated ; antennae long, basal flagellar segment lengthened, outer segments progressively smaller. Head dark grey ; anterior vertex about one and a half times the diameter of scape.

Pronotum brown. Mesonotal praescutum almost uniformly light fulvous brown, mid area faintly pruinose ; posterior sclerites of notum darker reddish brown ; setae of notum sparse but long. Pleura dark reddish brown. Halteres with stem dirty white, knob infuscated. Legs with coxae light brown ; trochanters yellow ; remainder of legs yellow ; claws very small. Wings (Text-fig. 13) light fulvous, cells *C* and *Sc*, with the stigma, very slightly darker ; veins yellow. Macrotrichia on longitudinal veins beyond level of origin of *Rs*, including also all of *Sc*, outer two-thirds of *M*, more than outer half of Cu_1, and virtually all of both Anal veins. Venation : *Rs* about one-third longer than R_{2+3+4}.

Abdomen obscure fulvous brown, including the genital segment, subterminal region slightly darker. Ovipositor with cerci slender, tips acute, margins smooth.

Holotype, ♀, N.E. BURMA : Adung Valley, 12,000 ft., 16.viii.1931 (*Kingdon-Ward & Lord Cranbrook*).

Paratopotype, ♀.

Among the regional members of the genus *Phyllolabis pallidivena* is most similar to *P. beesoni* Alexander, having the body coloration much the same, differing evidently in the wing coloration, especially the stigma and very pale wing veins.

Limnophila (Prionolabis) kingdonwardi **sp. n.**

General coloration polished black ; antennae of male elongate ; femora yellow basally, tips broadly blackened, more extensively so on fore and middle legs ; wings moderately infuscated, cells *C* and *Sc* and a cloud over the anterior cord darker ; cell M_1 present ; male hypopygium with outer dististyle shallowly bifid at apex ; inner style deeply divided into two long unequal arms.

Male. Length, about 8 mm. ; wing, 8.3 mm. ; antenna, about 2.8 mm.

Female. Length, about 8·5 mm. ; wing, 7·2 mm.

Rostrum and palpi black. Antennae dark brown, elongate in the male ; flagellar segments protuberant on lower face, dorsal surface with elongate verticils that exceed the segments, these smaller on outer segments ; verticils of lower protuberant face small, less than one-half the segment ; a short dense white pubescence on all flagellar segments. Head dull blackish grey ; vestiture elongate, black, porrect.

Pronotum dark brown. Mesonotum polished dark brown or brownish black ; vestiture of praescutal interspaces, scutum and scutellum very long, black, erect. Pleura brownish black, dorsopleural membrane dark brown. Halteres with stem whitened, knob weakly infuscated. Legs with coxae dark brown ; trochanters obscure yellow ; femora yellow basally, tips dark brown, more extensive on fore and middle pairs where about the outer two-thirds to three-fourths are darkened, on hind femora less than the outer half ; tibiae and basitarsi brownish yellow, tips narrowly dark brown, outer tarsal segments passing into dark brown ; legs with long conspicuous setae. Wings (Text-fig. 16) moderately infuscated, restrictedly patterned with darker brown, including stigma, cells *C* and *Sc* and narrow seams over anterior cord, prearcular field yellowed ; veins brown, yellowed in prearcular field. Longitudinal veins beyond cord chiefly with macrotrichia, lacking on R_{2+3+4} ; before cord on outer third of *Rs*, outer ends of *M* and *Cu*, and most of both Anal veins. Venation : Sc_1 ending nearly opposite fork of *Rs*, the latter elongate ; R_{2+3+4} and basal section of R_5 subequal ; cell M_1 present, longer than its petiole ; *m-cu* at or before midlength of M_{3+4}.

Abdomen, including hypopygium, black in male, more brownish black in female. Male hypopygium (Text-fig. 17) with the central area of posterior border of tergite, *t*, slightly produced ; tergite with long conspicuous setae. Basistyle, *b*, with long setae, including a compact group of very long bristles on mesal face near apex, the longest about as long as the outer dististyle. Outer dististyle, *d*, dilated at base, narrowed outwardly, apex shallowly and unequally bifid. Inner dististyle deeply divided, the inner arm shorter and more slender, outer arm fringed on inner margin with long erect setae. Phallosome, *p*, as figured ; basal plates enlarged ; gonapophyses narrow, tips obtuse ; aedeagus long and slender but with an oval flange at near midlength, this separated from remainder of phallosome by hyaline membrane.

Holotype, ♂, N.E. BURMA : Adung Valley, 8,000 ft., 12.vi.1931 (*Kingdon-Ward & Lord Cranbrook*).

Allotopotype, ♀, with the type, 9.vi.1931.

This distinct fly is named after the late Frank Kingdon-Ward, outstanding botanist and plant collector, whose accounts of his expeditions in Manipur, northern Burma and southeastern Tibet have been of great value in an understanding of the Tipulidae that he captured. The only other regional member of the subgenus *Prionolabis* Osten Sacken having cell M_1 of the wings present is *Limnophila* (*Prionolabis*) *pilosula* Alexander, of western China. The others, including *L.* (*P.*) *carbonis* Alexander, *L.* (*P.*) *lictor* Alexander and *L.* (*P.*) *poliochroa* Alexander, of western China, *L.* (*P.*) *fletcheri* Senior-White and some others still undescribed from the eastern Himalayas, lack this cell and all differ markedly in hypopygial structure. In the western Palaearctic fauna, *L.* (*P.*) *longeantennata* Strobl has cell M_1 present, *L.* (*P.*) *cognata* Lackschewitz and *L.* (*P.*) *platyptera* (Macquart) with the cell lacking, all with entirely different hypopygia.

Cheilotrichia (Empeda) microdonta Alexander

Cheilotrichia (*Empeda*) *microdonta* Alexander, 1957, Ann. Mag. Nat. Hist. (12) **10** : 295.

The type was from Mahthantir Gah, Kashmir, altitude 11,000 ft., taken August 9, 1954 by Fernand Schmid. The present material greatly extends the known range.

Tibet : Gyantse, 13,000 ft., 4.viii.1928 (*F. M. Bailey*).

Ormosia (Ormosia) grahami Alexander

Ormosia grahami Alexander, 1931, Philippine Jour. Sci. **44** : 364–365, pl. 1, fig. 20 (wing).

The type of this very distinct fly was from Szechwan, China, taken June 30, 1929 by David C. Graham. It is known also from Sikkim, where it was secured at Chumzomoichoka, in the *Rhododendron* association, altitude 11,800 ft., by Fernand Schmid, and from Kumaon, in the western Himalayas, taken at Kutara, Pauri Garhwal, altitude 12,000 ft., also by Schmid.

N.E. Burma : Adung Valley, 12,000 ft., 11.viii.1931 (*Kingdon-Ward & Lord Cranbrook*).

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OBSERVATIONS ON AFRICAN MEALY BUGS (HEMIPTERA : COCCOIDEA)

G. DE LOTTO

BULLETIN OF
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ENTOMOLOGY Vol. 14 No. 8
LONDON: 1964

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BY

G. DE LOTTO
Scott Agricultural Laboratories, Nairobi

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SYNOPSIS

Thirty new species of Pseudococcidae from Africa south of the Sahara are described ; *Chorizococcus lounsburyi* (Brain, 1912), and *Phenacoccus graminosus* McKenzie, 1960, are redescribed. Several records from new hosts and localities of old species, together with notes on their distribution and generic assignment are given. Seven new genera are described.

INTRODUCTION

WITH the descriptions of thirty more species, the study of the new Pseudococcidae from Africa south of the Sahara accumulated in the past in the collection of the Scott Agricultural Laboratories, Nairobi, is practically completed. Some ten or twelve species, all very likely new, had to be omitted, however, either because the material available was in too poor a condition or because the structural differences which distinguished them from their closest relatives could not adequately be valued, and further series of specimens must be examined before any satisfactory conclusion can be reached.

Though the purpose of this paper is mainly concerned with the identity and distribution of the species, a preliminary attempt has been made to review the status and composition of some genera. In order to accommodate certain very peculiar species, seven new monotypical genera have been introduced. Some morphological features exhibited by a few species caused serious classificatory problems, which could not be settled at the present stage of this work. The generic assignment of the species in question is therefore entirely provisional, pending further study.

All records of host plants and localities or territories of species already known from the area under review, are new. On the basis of observations carried out so far, a few notes have been included on the distribution of some species, with particular emphasis on those of economic importance.

The present work has been financed by the Colonial Development and Welfare Fund.

DESCRIPTIONS AND RECORDS OF SPECIES

CATAENOCOCCUS Ferris, 1955

Cataenococcus Ferris, 1955 : 3.

Type species : *Dactylopius olivaceus* Cockerell, 1896.

From Ferris's (1955) redescriptions of the type species, the only feature of taxonomic value by which this genus can be separated from the very closely related *Farinococcus* Morrison, 1922 (type species : *F. multispinosus* Morrison, 1922) is the position of the anal ring. In *Cataenococcus* this organ is situated at, or close to, the extremity of the abdomen, whilst in *Farinococcus* it is displaced towards the centre of the body by three or four times its diameter.

It was on the basis of this character that the two East African species, *jasmini* De Lotto, 1961, and *hypogeus* De Lotto, 1961, were assigned to *Cataenococcus* instead of *Farinococcus*. To them should be added *C. markhamiae*, here described as new.

PROVISIONAL KEY TO SPECIES

1 Anal lobe cerarii with but two spines enclosed within an elongate chitinized area **markhamiae**

– Anal lobe cerarii with more than two spines ; area about the cerarian spines not chitinized 2

2 (1) Ventral side of the anal lobes with an elongate irregularly shaped chitinized bar ; dorsal setae all finely pointed . . . . **jasmini**

– Anal lobes without ventral chitinized bar ; setae of the dorsal prosoma variously knobbed near the apex . . . . **hypogeus**

Balachowsky (1954) assigned *Farinococcus loranthi* Strickland, 1947, to the genus *Cataenococcus* and presented a detailed redescription and a diagram of the species based on specimens he collected in French Guinea on aerial roots of *Rhizophora racemosa*. On comparing his diagnosis with Strickland's, pronounced differences of specific significance in some morphological features suggest that the material Balachowsky had at hand did not in fact belong to the species Strickland originally described from Ghana on *Loranthus bangwensis*.

Cataenococcus markhamiae sp. n.

(Plate 1)

Mounted specimens very broadly oval to nearly circular in outline ; length up to 3·6 mm. Anal lobe cerarii each with two robust conical spines surrounded by 5–7 auxiliary setae and 20–30 trilocular pores ; each cerarius is enclosed within an irregularly elongate chitinized area. The remaining spines along the margin of the body are very variable in size, and are arranged singly or in small groups set at irregular intervals. Ventral side of each anal lobe with an elongate chitinized bar ; apical seta 212–234μ;[1] subapical one 110–146μ. Multilocular disc pores arranged in four or five transverse groups on the ventral midregion of the abdomen. Their number is as follows : (ix plus x) 15–22 ; (viii) 29–40 ; (vii) 25–37 ; (vi) 1–5 ; (v) 0–2. No multilocular pores occur on the ventral prosoma or on the dorsum. Tubular ducts of oral collar type of two sizes. The larger ones are arranged in small groups on the ventral marginal

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[1] All measurements in microns refer to the length of the structure for which they are given.

area of the last four or five abdominal segments. Ducts of the smaller size very few on the ventral side of the abdomen. Trilocular pores numerous on either side of the body. Simple disc pores apparently absent. Circulus transversely elongate, with surface membranous. Dorsal setae numerous and very short, except a few on the median area of the last abdominal segments which are fairly long and robust ; ventral setae long. Legs well developed, stout ; hind coxae and tibiae with few minute translucent pores ; dimensions of legs (iii) : trochanter plus femur 270–300μ ; tibia plus tarsus 248–270μ. Anal ring entire, set close to the posterior end of the body, cellular, with six setae measuring 117–139μ. Beak 212–226μ. Antennae 8-segmented, or 7-segmented with a pseudoarticulation on the third segment ; total length 372–409μ.

Holotype. Adult ♀. UGANDA : Sebei, 1.iii.1957, on roots of *Markhamia* sp. (*D. N. McNutt*). Coll. No. 2288.

Paratypes. 3 adult ♀. Same data as holotype.

CENTROCOCCUS Borchsenius, 1948

Echinococcus Balachowsky, 1936 : 157 [*non* Rudolphi, 1801].
Centrococcus Borchsenius, 1948 : 953 [*nomen novum*].

Type species : *Centrococcus echinatus* (Balachowsky, 1936).

In Africa south of the Sahara this genus is represented so far by a single species only.

Centrococcus insolitus (Green, 1908)

Phenacoccus insolitus Green ; Newstead, 1911 : 164.
Tylococcus insolitus (Green) Brain, 1915 : 95.
Tylococcus insolitus (Green) ; Brain & Kelly, 1917 : 182.
Phenacoccus insolitus Green ; James, 1934 : 272.
Tylococcus insolitus (Green) ; Munro & Fouché, 1936 : 96.
Centrococcus insolitus (Green) ; Williams, 1958 : 224.

Very likely this species is an immigrant. It has been twice recorded from Kenya. First by Newstead (1911) from Kibwezi on *Tabernaemontana* sp. and later by James (1934) from Naivasha on *Sida rhombifolia* L., the latter being the westernmost locality where the species has been found in East Africa so far. Very uncommon.

KENYA : Nairobi, vii.1926, on *Solanum giganteum* Jacq. (*T. W. Kirkpatrick*) ; Tabere, 26.viii.1959, on *Solanum incanum* L. (*D. J. McCrae*).

ZANZIBAR : 14.ii.1956, on *Physalis peruviana* L. (*R. H. Le Pelley*).

CHAETOCOCCUS Maskell, 1898

Chaetococcus Maskell, 1898 : 249.

Type species : *Sphaerococcus bambusae* Maskell, 1892.

Structurally this genus is very closely allied to *Antonina* Signoret, 1875 (type species : *A. purpurea* Signoret, 1875). As has been pointed out by Morrison and Morrison (1922), and more recently by Williams (1958*a*), the two genera are doubtfully distinct.

Chaetococcus bambusae (Maskell, 1892)

Chaetococcus bambusae (Maskell); Williams, 1958 : 206.

UGANDA : Entebbe, 5.x.1952, on bamboo (*T. R. Odhiambo*).

CHORIZOCOCCUS McKenzie, 1960

Chorizococcus McKenzie, 1960 : 692.

Type species : *Chorizococcus wilkeyi* McKenzie, 1960.

To this genus are referred at present only two African species, both structurally very closely allied to the type, despite the absence of the denticle on the plantar surface of the claws. They are *Pseudococcus lounsburyi* Brain, 1912, originally described from South Africa on specimens collected on *Agapanthus umbellatus* L'Herit., and *Spilococcus pusillus* De Lotto, 1961 from Kenya, from roots of *Bidens pilosa* L., as well as from roots of *Indigofera* sp., *Solanum tuberosum* L., and *Ipomoea batatas* Poir.

Chorizococcus lounsburyi (Brain, 1912)

(Plate 2)

Pseudococcus lounsburyi Brain, 1912 : 179.
Pseudococcus lounsburyi Brain ; Brain, 1915 : 119.
Pseudococcus lounsburyi Brain ; Munro & Fouché, 1936 : 92.
Pseudococcus lounsburyi Brain ; De Lotto, 1958 : 96.

On dealing with the identity of the mealy bugs described by C. K. Brain from South Africa (De Lotto, 1958), I assumed as correct the interpretation of this species given by Ferris (*in :* Zimmerman, 1948 ; Ferris, 1950). According to McKenzie (1960) the insect dealt with by Ferris from the Hawaiian Islands and California, U.S.A., was not *lounsburyi* but *Pseudococcus* (*Trionymus*) *peregrinus* described by Green in 1925 from England. Recently Williams (1962) after comparing the types of *peregrinus* with specimens of *lounsburyi* from South Africa, Egypt, Hawaii, Holland and England, came to the conclusion that the two species are structurally identical. He pointed out that the differences in colour and habit of the adult female of *peregrinus* come within the range of variation of *lounsburyi*.

According to Brain (1912) the adult female is " at the time of spinning the ovisac, large, 3·7 mm. (4·1 mm. with caudal appendages) by 1·65 mm. broad, becoming somewhat narrower towards the anterior and posterior ends ; colour purplish, showing distinctly through the ashy white secretion ; segmentation very distinct ; legs and antennae very pale ; lateral wax appendages absent, caudal ones stout at base, somewhat conical, snow white, and appearing granular. Inner pair longer and stouter than the outer ones. . . . Ovisac : when complete entirely enclosing the adult ♀, large, elongate, oval, composed of threads which, when seen under the microscope have almost a glassy appearance ; 4·5 mm. long, by 2·25 mm. broad. Large numbers of ovisacs were often found matted together between leaf-bases, sometimes forming a mass two inches long by almost two inches wide."

The following is a redescription of Brain's species based on five paratypes made available from the South African National Collection of Insects, Pretoria, and on a series of ten supplementary specimens from *Agapanthus* sp. from South Africa and Kenya, as listed below.

Mounted specimens elongate elliptical, with anal lobes fairly well developed ; length up to 3·1 mm. Margin of the body with one pair of marginal cerarii on each of the last two abdominal segments. Anal lobe cerarii each built up with two robust conical spines surrounded by 7 to 9 auxiliary setae and 35–45 trilocular pores ; area about the cerarian spines not chitinized. Penultimate cerarii (ii) each with two spines slightly smaller than those of the anal lobe cerarii. Ventral side of each anal lobe without chitinized bar. The apical seta in all paratypes at hand was missing ; according to Brain (1912) it attained the length of 144–160 [146–168]μ;[2] subapical seta 44–51 [37–44]μ. Multilocular disc pores arranged in transverse groups on the midregion of the last five—occasionally six—abdominal segments as follows : (ix plus x) 31–40 [30–40] ; (viii) 31–42 [30–50] ; (vii) 15–26 [25–36] ; (vi) 16–28 [13–30] ; (v) 6–20 [3–13] ; (iv) 0 [0–2]. A few pores (1 to 3) occasionally are scattered on the dorsal side of some of the abdominal segments. No multilocular pores occur on the ventral and dorsal prosoma. Tubular ducts of oral rim type tending to be arranged in dorsal longitudinal series. The number of pores on the last six abdominal segments anterior to the anal lobe one, is : (viii) 5–6 [3–6] ; (vii) 3–6 [3–6] ; (vi) 6–9 [4–9] ; (v) 5–9 [3–9] ; (iv) 7–10 [5–7] ; (iii) 6–10 [3–6]. A few ducts are scattered on the dorsal prosoma and on the ventral marginal area of the abdominal segments anterior to the genital opening and the thorax. Tubular ducts of the oral rim type of two sizes. The larger ones very numerous ; they are set in irregular transverse rows on the ventral side of the last five abdominal segments and on the dorsal side of the segments (viii) and (vi) to (iv) ; other pores are arranged in groups on the ventral and dorsal marginal areas as far as the head. The ducts of smaller size are few and mostly associated with the abdominal multilocular disc pores ; a few are scattered on the dorsal side of the abdomen. Trilocular pores not numerous and evenly distributed on either side of the body. Simple disc pores smaller than the trilocular ones, few and sparse. Anterior and posterior dorsal ostioles well developed with lips membranous. Circulus lacking. Dorsal setae few, short and slender ; ventral ones noticeably longer. Legs well developed, without ungual denticle ; translucent pores missing ; dimensions of legs (iii) : trochanter plus femur 300–350 [256–307]μ ; tibia plus tarsus 321–350 [270–321]μ. Anal ring entire, apical, with six setae measuring 117–139 [110–124]μ. Beak 95–109 [80–95]μ. Antennae with eight segments ; total length 394–438 [350–416]μ.

South Africa : Kenilworth, 14.ix.1910,[3] on *Agapanthus umbellatus* L'Herit. (*C. P. Lounsbury*), type series ; Stellenbosch, 15.ii.1930, on *Agapanthus* sp. (*C. J. Joubert*) ; Pretoria, 16.i.1957, on *Agapanthus* sp. (*G. De Lotto*).

Kenya : Nairobi, 21.x.1941, on *Agapanthus* sp. (*H. Wilkinson*).

Chorizococcus pusillus (De Lotto, 1961) **comb. n.**

Spilococcus pusillus De Lotto, 1961 : 233.

Uganda : Tororo, 20.vii.1961, on roots of *Ocimum* sp. (*G. De Lotto*).

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[2] The figures in square brackets are the values found on specimens of the supplementary series from South Africa and Kenya.

[3] In the original paper the collecting date is 10.ix.1910.

CRYPTORIPERSIA Cockerell, 1899

Cryptoripersia Cockerell *in* Ehrhorn, 1899 : 5.

Type species : *Ripersia arizonensis* Ehrhorn, 1899.[4]

Structurally *Cryptoripersia* is very closely related to *Trionymus* Berg, 1899. The main differences between the two genera are to be found in the structure of the anal lobe cerarii and in the position of the anal ring. In *Cryptoripersia* the anal lobe cerarii are formed of two longish slender spines, without any concentration of trilocular pores, and the anal ring is more or less removed from the apex of the abdomen. In *Trionymus* the spines of the anal lobe cerarii are short, normally robust and always surrounded by a grouping of trilocular pores ; the anal ring is apical.

According to Ferris (1953) the genus *Rhodania* Goux, 1935 (type : *R. porifera* Goux, 1935) is probably a synonym of *Cryptoripersia*.

The new species from South Africa here assigned to *Cryptoripersia* has many features in common with the type species, yet the antennae tend to have more segments and the anal ring is quite different in shape. These differences may well have a generic value. In the writer's opinion, however, they do not warrant the erection of a new genus at the present stage of this work.

Cryptoripersia corpulenta sp. n.

(Plate 3)

The mounted female holotype is a fairly old adult, very broadly oval in outline, with anal lobe nearly obsolete ; length 1·5 mm. Marginal cerarii reduced to one pair on the anal lobe segment. Each cerarius is formed with two slender spines, without any grouping of trilocular pores and devoid of auxiliary setae ; area about the cerarian spines not chitinized. Ventral side of each anal lobe without chitinized bar ; apical seta 88μ ; subapical one not differentiate from the surrounding ventral body setae. Multilocular disc pores numerous on either side of the body. Tubular ducts of the oral collar type of two sizes, both numerous all over the dorsum and venter. Trilocular pores not very abundant and evenly distributed. Simple disc pores smaller than the trilocular pores, rather few and sparse. Anterior and posterior dorsal ostioles inconspicuous with lips membranous. Circulus absent. Dorsal and ventral body setae short and slender, few. Legs short, otherwise normal ; translucent pores lacking ; dimensions of legs (iii) : trochanter plus femur 146μ ; tibia plus tarsus 182μ. Anal ring entire, subapical, with a few elongate cells ; the anterior portion of the ring is very narrow and heavily chitinized ; anal ring setae six in number, all very short, measuring 18μ in length. Beak 80μ. One of the antennae was formed with eight segments ; the other with seven, with a pseudoarticulation on the fourth segment ; total length 204μ.

Holotype. Adult ♀. SOUTH AFRICA : Ceres, 23.iv.1945, on *Chrysocoma tenuifolia* Berg (*C. J. Joubert*). Coll. No. 2726.

CYPERIA gen. n.

Type species : *Pseudococcus percrassus* De Lotto, 1961.

Pseudococcidae with eighteen pairs of marginal cerarii, all built up with more than two conical spines and with many robust auxiliary setae ; outline of the body very broadly elliptical

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[4] The type of the genus is *Ripersia arizonensis* Ehrhorn, 1899, not *R. trichura* Cockerell, 1901, as indicated by Ferris (1953 : 307).

to nearly circular ; antennae with eight segments ; legs well developed, stout, without denticle on the claws ; anterior and posterior dorsal ostioles prominent ; dorsal tubular ducts entirely lacking ; ventral tubular ducts of the oral collar type ; circulus present ; multilocular disc pores occurring in transverse segmental rows on the ventral side of the abdomen ; anal ring entire, cellular, set at the apex of the abdomen, with six setae.

Genus of the *Planococcus* series very closely allied to *Planococcoides* Ezzat & McConnell, 1956, from which it differs in having all marginal cerarii supplemented by numerous stout auxiliary setae. In *Planococcoides* only the spines of the anal lobe cerarii are associated with a few auxiliary setae.

DYSMICOCCUS Ferris, 1950

Dysmicoccus Ferris, 1950 : 53.

Type species : *Dactylopius brevipes* Cockerell, 1893.

In addition to the type species, two African species should be included in this genus. They are *Dysmicoccus senegalensis* Balachowsky, 1953 and *D. mollis* De Lotto, 1961.

KEY TO SPECIES

1	Multilocular disc pores set in small groups on the last two or three abdominal segments	***brevipes***
	Multilocular pores rather numerous and arranged in transverse rows on all abdominal segments	2
2 (1)	Antennae with 8 segments	***mollis***
	Antennae with 7 segments only	***senegalensis***

Dysmicoccus brevipes (Cockerell, 1893)

Dactylopius bromeliae (Bouché) ; Signoret, 1875 : 310.
Dactylopius bromeliae (Bouché) ; Cockerell, 1894 : 178.
Pseudococcus bromeliae (Bouché) Fernald, 1903 : 98.
Pseudococcus bromeliae (Bouché) ; Brain, 1915 : 109.
Pseudococcus crotonis Green ; Green, 1916 : 375. [misidentification].
Pseudococcus bromeliae (Bouché) ; Brain & Kelly, 1917 : 181.
Pseudococcus bromeliae (Bouché) ; Gowdey, 1917 : 187.
Pseudococcus brevipes (Cockerell) ; Kirkpatrick, 1927 : 20.
Pseudococcus bromeliae (Bouché) ; Ghesquière, 1927 : 313.
Pseudococcus longirostralis James, 1936 : 207.
Dysmicoccus brevipes (Cockerell) ; De Lotto, 1957 : 197.
Dysmicoccus brevipes (Cockerell) ; Williams, 1958 : 213.

The specimens at hand agree well with the redescription and diagram given by Ferris (1950). In East Africa the species is widely distributed and fairly common either on roots or on the aerial organs of the hosts.

KENYA : Kibarani, 30.vii.1942, on *Anacardium occidentale* L. (*R. H. Le Pelley*) ; Gazi, 24.ii.1951, on *Ananas sativus* Schult. f. (*R. H. Le Pelley*) ; Nairobi, 28.iii.1951, on roots of *Rumex acetosa* L. (*A. Bogdan*), 20.iii.1952, on bulbs of *Watsonia* sp. (*G. M. Lavers*), 30.iv.1959, on roots of *Anemone* sp. (*J. F. Graham*), 1.vi.1956, on roots of

Aristida adoensis Hochst. (*G. De Lotto*) ; Thika, 7.i.1938, on *Ananas sativus* Schult. f. (*A. R. Melville*) ; Ruiru, 21.i.1955, on roots of *Ipomoea batatas* Poir. (*D. J. McCrae*) ; Kisumu, 3.v.1955, on *Zea mays* L. (*T. J. Crowe*) ; Malindi, i.vi.1956, on *Mangifera indica* L. (*A. R. Melville*) ; Fort Ternan, 8.iv.1954, on *Ananas sativus* Schult. f. (*T. J. Crowe*).

TANGANYIKA : Arusha, 16.i.1961, on roots of *Pennisetum purpureum* K. Schum. (*G. Swain*) ; Lyamungu, 26.x.1937, on *Ananas sativus* Schult. f. (*A. R. Melville*).

UGANDA : Bwamba, 6.vi.1951, on *Coffea robusta* Lindl. (*D. J. McCrae*) ; Toro, 26.viii.1954, on roots of *Trifolium* sp. and *Rheum rhaponticum* L. (*A. P. G. Michelmore*) ; Mukono, 24.ii.1955, on *Musa sapientum* Kuntze (*A. P. G. Michelmore*); Kampala, 3.x.1958, on roots of *Gossypium* sp. (cotton) (*E. D. L. Matega*).

ZANZIBAR : 23.iii.1953, on *Cocos nucifera* L., 26.x.1942, on *Ananas sativus* Schult. f. (*R. H. Le Pelley*), 2.v.1961, on *Theobroma cacao* L. (*C. P. Hoyt*).

EASTIA gen. n.

Type species : *Eastia jouberti* sp. n.

Pseudococcidae with the cerarian spines set in a continuous fringe all along the margin of the body and extending across the dorsal side of the last abdominal segment ; outline of the body apparently elongate ; antennae 8-segmented, at times with a pseudoarticulation on the last segment ; legs all well developed, stout, with a denticle on all claws ; anterior and posterior dorsal ostioles inconspicuous ; dorsal tubular ducts entirely absent ; ventral tubular ducts of the oral collar type present on the abdominal segments ; other ducts of the same type which partly project from the dermis, are set in a large group on the ventral midregion of the mesothorax ; quinquelocular pores distributed all over the venter ; trilocular pores occurring only on the lips of the dorsal ostioles and among the cerarian spines of the marginal fringe ; multilocular disc pores set in rows on the ventral midregion of the abdomen ; circulus absent ; anal ring entire, apical, with six setae ; dorsal setae very short, lanceolate ; ventral ones much longer and finely pointed.

This genus somewhat resembles *Puto* Signoret, 1876 [type species : *Puto antennatus* (Signoret, 1875)], from which it differs in having the cerarian spines set in an uninterrupted fringe all along the margin of the body and in the presence of quinquelocular pores on the ventral side of the body. In *Puto* the spines are grouped in well separated marginal cerarii and the quinquelocular pores are entirely lacking.

Eastia jouberti sp. n.

(Plate 4)

The type series is represented by old adult females with the ventral side of the body elongate and the dorsal dermis strongly dilated and extending on either side of the lateral margins of the body ; length up to 4 mm. Margin of the body with an uninterrupted fringe of cerarian spines, two to five spines wide ; the spines are well developed, conical or somewhat lanceolate, finely or bluntly pointed and slightly variable in size ; the fringe extends on the dorsum of the last abdominal segment, in front of the anal ring ; among the cerarian spines are intermingled some trilocular pores ; on the dorsal side of the last abdominal segment some spines are enclosed within an elongate chitinized area. Ventral side of each anal lobe without chitinized bar ; apical seta 146–220μ long. Multilocular disc pores very numerous and arranged in transverse rows on the ventral side of the last five abdominal segments ; the number of pores occurring on each segment could not be counted due to distortions of the body skin. Tubular ducts of the oral collar type very few on the ventral submedian area of the last two abdominal segments anterior to the genital opening. A large group of ducts of the same type, but slightly larger in diameter and partly extruding from the body integument, occurs on the ventral midregion of the mesothorax. Quinquelocular pores numerous all over the venter, except on the last abdominal segment and on the head where they are missing altogether. Besides the trilocular pores associated with the marginal fringe of spines, a few more are crowded on the lips of the dorsal ostioles ; on the remaining surface of the dorsum and venter they are entirely lacking. Anterior and posterior dorsal ostioles rather inconspicuous, with lips slightly chitinized. Circulus lacking. Dorsal setae very small, variable in size, all curved and somewhat lanceolate, rather few and scattered ; ventral setae much longer and robust. Legs all well developed, without translucent pores ; claws with a small denticle ; dimensions of legs (iii) : trochanter plus femur 400–438μ ; tibia plus tarsus 452–482μ. Anal ring entire, cellular, set at the apex of the body and provided with six setae 240–292μ long. Anterior and posterior stigmatic openings very large. Beak dimerous 117–124μ. Antennae 8-segmented, at times marked with a pseudoarticulation on the terminal segment ; total length 562–628μ. Eyes prominent.

Holotype. Adult ♀. SOUTH AFRICA : East London, vi.1930, on *Podocarpus* sp. (*H. K. Munro*). Coll. No. 2607.

Paratypes. 6 adult ♀. Same data as holotype.

The species is named after Mr. C. J. Joubert, Assistant Director of Agriculture, Winter Rainfall Region, Stellenbosch, South Africa.

EURYCOCCUS Ferris, 1950

Eurycoccus Ferris, 1950 : 81.

Type species : *Pseudococcus jessica* Hollinger, 1916.

Ferris described this genus in order to accommodate a small batch of North American species, which, despite the strong reduction in the number of marginal cerarii—and in one instance their absence—could not be referred to *Trionymus, as* this genus was conceived by him.

Williams (1958*a*) assigned *Dactylopius coccineus* Newstead, 1908, to *Eurycoccus*, and De Lotto (1961) described as new *E. glomerulus* from Kenya from specimens collected on roots of a grass. The latter is somewhat atypical because the circulus is small, rounded and apparently unfoldable ; and the antennae are reduced to six or seven segments. In spite of these differences, its general appearance suggests a closer affinity with *Eurycoccus* than with any related genus whose identity is adequately known at present.

Eurycoccus coccineus (Newstead, 1908)

Dactylopius coccineus Newstead, *in* Sjöstedt, 1908 : 8.
Pseudococcus coccineus (Newstead) Lindinger, 1913 : 68.
Eurycoccus coccineus (Newstead) Williams, 1958 : 217.

Described originally from Tanganyika on *Acacia* sp., the following is the first record from Kenya. In either territory the species is apparently very uncommon.

KENYA : Naivasha, 9.vii.1953, on *Acacia* sp. (*H. Bredo*).

FERRISIANA Takahashi, 1929

Ferrisia Fullaway, 1923 : 311 [*non Ferrissia* Walker, 1903].
Ferrisiana Takahashi, 1929 : 429 [*nomen novum*].

Type species : *Dactylopius virgatus* Cockerell, 1893.

In the region under review this genus is represented by the type species only, which very likely is an immigrant.

Ferrisiana virgata (Cockerell, 1893)

Dactylopius (*Pseudococcus*) *virgatus madagascariensis* Newstead ; Newstead, 1911 : 166.
Pseudococcus marchali Vayssière, 1912 : 366.
Pseudococcus virgatus madagascariensis Newstead ; Lindinger, 1913 : 68.
Dactylopius (*Pseudococcus*) *virgatus madagascariensis* Newstead ; Macfie, 1913 : 34.
Pseudococcus marchali Vayssière ; Vayssière, 1913 : 428.
Dactylopius virgatus madagascariensis Newstead ; Newstead, 1914a : 523.
Pseudococcus virgatus (Cockerell) ; Brain, 1915 : 133.
Pseudococcus virgatus (Cockerell) ; Green, 1916 : 375.
Pseudococcus virgatus (Cockerell) ; Newstead, 1917 : 127.
Pseudococcus virgatus (Cockerell) ; Brain & Kelly, 1917 : 182.
Pseudococcus virgatus (Cockerell) ; Gowdey, 1917 : 187.
Ferrisia (*Pseudococcus*) *virgatus* (Cockerell) ; Kirkpatrick, 1927 : 16.
Pseudococcus virgatus (Cockerell) ; James, 1933 : 435.
Ferrisiana virgata (Cockerell) ; Colizza, 1934 : 237.
Pseudococcus virgatus (Cockerell) ; Munro & Fouché, 1936 : 93.
Ferrisia virgata (Cockerell) ; Hall, 1943 : 5.
Ferrisia virgata (Cockerell) ; Strickland, 1947 : 508.
Ferrisia virgata madagascariensis (Newstead) ; Strickland, 1947 : 509.
Ferrisiana virgata (Cockerell) ; Williams, 1958 : 214.

The available material listed below agrees well with Ferris's diagnosis (1950), except that the multilocular disc pores on the ventral midregion of the abdomen are normally arranged in three groups instead of two.

This mealy bug is very common and well established throughout Africa south of the Sahara. In the central highland of Kenya it has been observed that during long spells of dry weather the populations tend to move to the collar region of the host plant, under ground level and, occasionally, to the roots.

CONGO : Kivu, 8.i.1936, on *Coffea arabica* L. (*C. D. Knight*).

KENYA : Thika, 1.iii.1937, on *Coffea arabica* L. (*A. R. Melville*) ; Nairobi, 13.v.1951, on *Euphorbia pulcherrima* Willd., 6.iv.1951 on *Ficus elastica* Roxbg. (*G. De Lotto*) ; Gazi, 24.ii.1951, on *Anacardium occidentale* L. (*R. H. Le Pelley*) ; Athi River, 26.x.1953, on roots of *Tagetes minuta* L. (*G. De Lotto*) ; Kisumu, 10.ii.1956, on *Psidium guajava* L., 18.vii.1957, on *Primula* sp. (*T. J. Crowe*) ; Namanga, 21.i.1961, on *Abutilon mauritiense* (Jacq.) Medic. (*G. De Lotto*).

SUDAN : Torit, 31.iii.1953, on *Coffea arabica* L. (*F. P. Cereda*).

TANGANYIKA : Kibondo, 15.xi.1961, on *Coffea arabica* L. (*R. G. Tapley*).

SOUTH AFRICA : Durban, 17.v.1961, on *Agave* sp., 22.v.1961 on *Codiaeum* sp. (*D. P. Annecke*).

UGANDA, Serere, 17.xii.1953, on *Gossypium* sp. (cotton) (*H. D. Mubbiro*) ; Bugusege, 20.xii.1956, on *Coffea arabica* L. (*D. N. McNutt*) ; Kampala, 5.iv.1957, on *Coffea robusta* Lindl. (*D. N. McNutt*).

GEOCOCCUS Green, 1902

Geococcus Green, 1902 : 262.

Type species : *Geococcus radicum* Green, 1902.

A very peculiar genus referable to the *Rhizoecus* series. In Africa south of the Sahara it is represented by one species only.

Geococcus coffeae Green, 1933

Geococcus coffeae Green ; Strickland, 1947 : 502.
Geococcus coffeae Green ; Williams, 1958 : 225.

This minute hypogeic mealy bug is already known from Ghana, Nigeria and Zanzibar. The following is the first record of the species from the East African mainland.

KENYA : Nairobi, 13.iii.1956, on roots of *Physalis edulis* Sims (*G. De Lotto*).

***LENANIA* gen. n.**

Type species : *Lenania prisca* sp. n.

Pseudococcidae with marginal cerarii entirely absent ; outline of the body broadly elliptical ; antennae 6- to 8-segmented ; legs well developed, stout, without ungual denticle ; either side of trochanters with three sensoria ; anterior and posterior dorsal ostioles present ; tubular ducts of oral collar type very numerous and either side of the body ; circulus lacking ; multilocular disc pores arranged in segmental rows on the ventral side of the abdomen ; others are scattered on the dorsal postsoma ; anal ring subapical, formed by a heavily chitinized ring devoid of cells and apparently without setae ; dorsal body setae short and slender ; ventral ones long and robust.

The peculiar form of the anal ring together with the presence of three sensoria on each side of the trochanters are the major features on which this genus is erected. The total absence of the marginal cerarii suggests a relationship with the genera *Mirococcus* Borchsenius, 1947 (type species : *Phenacoccus inermis* Hall, 1925), and *Mollicoccus* Williams, 1960 (type species : *M. guadalcanalanus* Williams, 1960). The type species of both are, however, provided with an ungual denticle which is lacking in *Lenania prisca*.

***Lenania prisca* sp. n.**

(Plate 5)

Mounted specimens rather broadly elliptical or oval with the legs and antennae strongly chitinized ; anal lobes obsolete ; length up to 3·1 mm. Marginal cerarii entirely absent. Apical seta 139–153μ ; subapical one not differentiated from the remaining ventral body setae.

Multilocular disc pores very numerous on the ventral side of the last five abdominal segments;[5] a few pores are scattered on the dorsal side of the abdomen ; no multilocular pores occur on either side of the prosoma. Tubular ducts of the oral collar type small, very numerous and distributed on either side of the body without any pattern. Trilocular pores abundant and evenly distributed ; a few are crowded near each stigmatic opening. Simple disc pores apparently missing. Anterior and posterior dorsal ostioles poorly developed with lips slightly chitinized and devoid of any grouping of trilocular pores or setae. Circulus absent. Dorsal setae on the last abdominal segment fairly long and robust ; remaining setae shorter and slender. Body setae on the midregion of the venter long and robust ; those on the marginal and submarginal areas much shorter and slender. Legs well developed, rather stout ; either side of the trochanters provided with three sensoria instead of the usual two ; translucent pores numerous on the femur and tibia of the hind legs ; claws without denticle ; dimensions of legs (iii) : trochanter plus femur 336–350μ ; tibia plus tarsus 336–343μ. Anal ring represented by a heavily chitinized ring, without cells, slightly opened anteriorly and with two minute rounded clear areas which very likely are the sockets of two setae. Beak apparently dimerous, but the segmentation is obscure ; length 95–102μ. Antennae with 6 to 8 segments, in all cases one of them is marked with a pseudoarticulation ; total length 343–380μ.

Holotype. Adult ♀. South Africa : Stellenbosch, ix.1930, on *Cliffortia strobilifera* Murr. (*C. J. Joubert*). Coll. No. 2644.

Paratype. 1 adult ♀. Same data as holotype.

LONDIANIA gen. n.

Type species : *Londiania obesa* sp. n.

Pseudococcidae with six or seven pairs of marginal cerarii on the last abdominal segments ; anal lobe cerarii with two slender variously curved or straight spines ; remaining cerarii with many spines distinctly shorter and more slender than those of the anal lobe cerarii ; outline of the body broadly oval ; antennae 6-segmented ; legs small, otherwise normal, without ungual denticle ; anterior and posterior dorsal ostioles well developed ; tubular ducts of the oral collar type occurring on the ventral side of the abdomen ; circulus lacking ; multilocular disc pores set in transverse rows on the ventral side of the abdomen ; anal ring entire, with a double row of cells and with eight robust setae ; body setae short and slender.

The most distinctive character of this genus is the presence of eight strong setae on the anal ring. Other features such as the reduction of the number of the antennal segments and marginal cerarii suggest a close relationship with *Trionymus* Berg, 1899, but *Londiania* differs from it in having the preanal cerarii built up from more than one or two spines. In the shape of the spines of the anal lobe cerarii *Londiania* resembles *Cryptoripersia* Cockerell, 1899, yet in the latter the marginal cerarii are reduced to one single pair on the anal lobes. In both *Trionymus* and *Cryptoripersia* the anal ring is provided with six setae only.

Londiania obesa sp. n.

(Plate 6)

Mounted specimens broadly oval, with anal lobes poorly developed ; length up to 2·3 mm. Margin of the body with apparently six or seven pairs of cerarii on the last abdominal segments. Anal lobe cerarii each with two long slender spines, straight or variously curved, without any

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[5] The number of multilocular disc pores could not be properly counted owing to the distortions of the segmental folds.

concentration of trilocular pores and devoid of auxiliary setae ; area about the spines not chitinized. The remaining cerarii are formed by groupings of spines much more slender and noticeably shorter than those of the anal lobe cerarii, thus resembling tufts of dorsal body setae. Among the spines are intermingled a few trilocular pores. An elongate group of similar spines occurs on the head. Ventral side of each anal lobe without chitinized bar ; apical seta 190–205μ; subapical one not differentiated from the surrounding ventral body setae. Multilocular disc pores set in transverse rows on the ventral side of the last six abdominal segments ; other pores are scattered on the midregion of the ventral prosoma and on the dorsal side of the abdomen. Dorsal tubular ducts lacking. Ventral tubular ducts of the oral collar type set in small groups on the marginal area of all abdominal segments ; a few are intermingled with the abdominal multilocular disc pores. Trilocular pores uniformly distributed, not numerous. Simple disc pores smaller than the trilocular pores, few and sparse. Anterior and posterior dorsal ostioles well developed with lips chitinized. Circulus absent. Dorsal and ventral body setae short and slender ; rather few. Legs short otherwise normal ; translucent pores lacking ; dimensions of legs (iii) : trochanter plus femur 175–197μ ; tibia plus tarsus 183–190μ. Anal ring entire, apical, with a double row of cells and with eight robust setae measuring 160–180μ in length. Beak 117–131μ. Antennae with 6 segments ; total length 255μ.

Holotype. Adult ♀. KENYA : Londiani, 2.iv.1957, on roots of *Panicum* sp. (*G. De Lotto*). Coll. No. 2152.

Paratype. 1 adult ♀. Same data as holotype.

MACONELLICOCCUS Ezzat, 1958

Maconellicoccus Ezzat, 1958 : 380.

Type species : *Phenacoccus hirsutus* Green, 1908.

This genus has been recently erected by Ezzat (1958) for the inclusion of the type species only. As he pointed out, *hirsutus* lacks the main structural features which characterize the genus *Phenacoccus* Cockerell, 1893. In view of the presence of a chitinized bar on the ventral side of the anal lobes, he placed his genus in the tribe *Planococcini*, Ezzat and McConnell 1956. The distribution of the dorsal tubular ducts of oral collar rim type suggests, in my opinion, a far closer similarity with the genus *Spilococcus* Ferris, 1950. In addition to the type, the genus *Maconellicoccus* includes *Pseudococcus ugandae* Laing, 1925, and *Spilococcus perforatus* De Lotto, 1954.

Maconellicoccus perforatus (De Lotto, 1954) **comb. n.**

Spilococcus perforatus De Lotto, 1954 : 114.

Structurally this species is very close to *M. hirsutus* (Green, 1908), and a study of the types may prove that the two species are identical. Williams (1958*a*) recently recorded *M. hirsutus* from the Sudan as living on many host plants.

From observations carried out so far in East Africa, the range of *M. perforatus* seems restricted to the eastern districts and offshore islands. The species is suspected of being a vector of a virus responsible for deformations which tend to arrest the growth of the young stems and branches of the host plants.

KENYA : Kibarani, 30.vii.1942, on *Hibiscus surratensis* L. and *Gossypium* sp. (cotton) (*R. H. Le Pelley*) ; Kilifi, viii.1942, on *Psidium guajava* L. (*R. H. Le Pelley*), 26.iv.1957, on *Ceiba pentandra* Gaertn. (*P. E. Wheatley*) ; Mombasa, 22.xii.1951, on *Hibiscus* sp. (*N. A. Dotiwala*).

TANGANYIKA : Tanga, 25.xi.1958, on *Theobroma cacao* L. (*R. G. Tapley*) ; Moshi, 20.ii.1956, on *Hibiscus* sp. (*I. E. Taylor*) ; Mbosho 20.i.1956, on *Coffea arabica* L. (*R. G. Tapley*).

ZANZIBAR : 2.vii.1953, on *Hibiscus* sp., 13.ii.1956 on *Theobroma cacao* L. (*R. H. Le Pelley*).

Maconellicoccus ugandae (Laing, 1925) **comb. n.**

Pseudococcus ugandae Laing, 1925 : 53.
Pseudococcus ugandae Laing ; Williams, 1958 : 24.

This species was previously known from the original record only. The available material listed below agrees adequately with the redescription and diagram given by Williams (1958*a*).

KENYA : Kisii, 15.ii.1956, on *Coffea arabica* L. (*A. Banks*).

UGANDA : Kampala, 13.ix.1929, on *Markhamia platycalyx* (Baker) Sprague (*H. Hargreaves*), 24.ii.1944, on *Albizzia stipulata* Boiss. (*T. H. C. Taylor*), 17.xi.1951, on *Acacia* sp. (*D. J. McCrae*) ; Toro, 14.iii.1951, on *Coffea arabica* L. (*D. J. McCrae*).

***MOMBASINIA* gen. n.**

Type species : *Pseudococcus pulcherrimus* De Lotto, 1961.

Pseudococcidae with altogether six pairs of marginal cerarii, two of which occur on the last two abdominal segments and four on the head and prothorax ; each cerarius with more than two conical spines and enclosed within a large chitinized area ; body elongate ; antennae with nine long slender segments ; legs, too, long and slender without ungual denticles ; anterior and posterior dorsal ostioles absent ; dorsal tubular ducts simple, namely without oral collar or oral rim, set in two groups close to the margin of the body, each of which is enclosed by multilocular disc pores arranged in a continuous row ; ventral ducts similar to those of the dorsum but slightly extruding from the dermis ; circulus absent ; quinquelocular pores lacking ; ventral multilocular disc pores arranged in transverse groupings on all abdominal segments, others are scattered on the prosoma ; anal ring entire, apical, with six setae ; dorsal setae short, conical or somewhat lanceolate, set singly or in small groups ; ventral setae normal.

This is a strongly modified genus. Despite the absence of the ungual denticles, the structure of the marginal cerarii and dorsal setae as well as the presence of nine-segmented antennae suggest relationship with the *Puto* series.

***NAIROBIA* gen. n.**

Type species : *Nairobia bifrons* sp. n.

Pseudococcidae with altogether fourteen pairs of cerarii of which eight pairs occur on the abdomen, one on meta- and mesothorax, and two on the prothorax and head ; each cerarius bears up to 9 to 12 conical spines ; outline of the body elongate oval ; antennae with nine long, slender segments ; legs, too, long and slender without ungual denticle ; anterior and posterior dorsal ostioles well developed ; tubular ducts of any type and multilocular disc pores entirely absent ; circulus lacking ; quinquelocular pores numerous and distributed all over the ventral side of the body only ; trilocular pores occurring on the dorsum and on ventral marginal area of the venter ; anal ring entire, cellular, set at the apex of the abdomen, with six setae ; dorsal setae minute, spiniform ; ventral ones long and slender.

The combination of the above characters is quite distinctive. Systematically, it may be retained as a modified genus of the *Phenacoccus* series.

Nairobia bifrons **sp. n.**

(Plate 7)

Mounted specimens elongate oval in outline, up to 2·2 mm. long. Margin of the body with a series of fourteen pairs of cerarii only. Anal lobe cerarii each built up with 9 to 12 conical spines somewhat different in size, beset by a few trilocular pores ; area about the cerarian spines not chitinized ; auxiliary setae lacking. Remaining cerarii similar to those of the anal lobes. Ventral side of each anal lobe without chitinized bar ; apical seta robust 175–210μ long. Multilocular disc pores and tubular ducts of any type totally lacking. Quinquelocular pores rather numerous and uniformly distributed on the ventral side of body. Trilocular pores evenly distributed on the dorsum ; a few occur on the marginal area of the venter. Simple disc pores smaller than the trilocular pores, few on either side of the body. Dorsal setae very few, minute, spiniform ; ventral ones more numerous, fairly long and very slender. Posterior dorsal ostioles prominent ; anterior ones less so ; in either case the lips are membranous. Circulus absent. Legs very long and slender ; claws without denticle ; hind legs without translucent pores ; dimensions of legs (iii) : trochanter plus femur 385–445μ ; tibia plus tarsus 520–560μ. Beak dimerous, 75–90μ long. Anal ring entire, apical, with six robust setae measuring 95–115μ. Antennae very long and slender, 9-segmented ; total length 920–1,020μ. Eyes prominent.

Holotype. Adult ♀. KENYA : Nairobi, 14.xii.1960, on the underside of leaves of *Linociera battiscombei* Hutch. (*G. De Lotto*). Coll. 2528.

Paratypes. 15 adult ♀. Same data as holotype.

OROCOCCUS **gen. n.**

Type species : *Pseudococcus cryophilus* De Lotto, 1961.

Pseudococcidae with two pairs of cerarii on the last abdominal segments ; anal lobe cerarii with up to eight spines of different size ; preanal ones with no more than four spines ; outline of the body elongate elliptical ; antennae normally with seven segments ; legs well developed, without ungual denticle ; anterior and posterior dorsal ostioles present ; tubular ducts very short, strongly chitinized, with a small median cup-like depression and with a heavily chitinized oral rim beneath the body integument ; in the type species these ducts are very numerous on either side of the body ; circulus lacking ; multilocular disc pores distributed on both sides of the body ; trilocular pores few and sparse ; anal ring entire, cellular, apical, with six setae ; body setae short and slender.

The most distinctive feature of this genus is the peculiar form of the tubular ducts, not yet found in any other Pseudococcid genus known to me. Other characters suggest a relationship with genera of the *Trionymus* series.

PARACOCCUS Ezzat & McConnell, 1956

Paracoccus Ezzat & McConnell, 1956 : 37.

Type species : *Pseudococcus burnerae* Brain, 1915.

This genus was erected by Ezzat and McConnell (1956) in their monograph of the world *Planococcini*, a new Pseudococcid tribe established by them for a group of genera having a chitinized bar on the ventral side of the anal lobes. The genus is believed to be valid, yet two major changes must be made to its original diagnosis in order to accommodate a batch of African species structurally very close to the type. The changes concern the chitinized bar and the dorsal oral rim ducts the presence or absence of which must be regarded as of specific significance only. Thus amended the genus *Paracoccus* should include species whose main feature is the occurrence of a series of seventeen pairs of marginal cerarii, all normally built up with two spines and devoid of auxiliary setae, except on the anal lobe cerarii in which one or more auxiliary setae are always present.

Besides the type *Pseudococcus burnerae* Brain, 1915, and *Paracoccus busiaensis, mutabilis, pinguis, tectus* and *trichinus* described as new in this paper, the following species from Africa south of the Sahara are referable to the genus *Paracoccus : Pseudococcus muraltiae* Brain, 1912, from South Africa; *P. erigeroni* James, 1935, from Kenya, *P. bruguierae* De Lotto, 1961, also from Kenya ; *P. spinulosus* De Lotto, 1961, from Uganda ; *Spilococcus diversus* De Lotto, 1961, from Kenya and Uganda ; *S. kajiadoensis* De Lotto, 1961 and *S. limuricus* De Lotto, 1961, both from Kenya.

Provisional Key to Species

1		Circulus lacking	2
		Circulus present	7
2	(1)	Ventral side of each anal lobe with an elongate chitinized bar . .	***pinguis***
		Chitinized bar on the anal lobes entirely absent	3
3	(2)	Dorsal setae long and robust ; ventral abdominal multilocular disc pores arranged in three or four small groups	***spinulosus***
		Dorsal setae short and slender ; multilocular disc pores set in five to seven groups	4
4	(3)	Dorsum with some oral rim ducts	5
		Dorsal oral rim ducts lacking	6
5	(4)	Ventral abdominal multilocular disc pores arranged in seven groups ; on the segments (viii) to (vi) part of the pores are scattered near the basal margin	***trichinus***
		Multilocular disc pores set in five groups ; on the abdominal segments anterior to the genital opening the pores are arranged in transverse rows along the distal margin only.	***muraltiae***
6	(5)	Multilocular disc pores present on the ventral side of the abdomen only ; dorsal oral rim ducts very few	***erigeroni***
		A few multilocular disc pores always present on the ventral prosoma and on the dorsal side of the abdomen ; dorsal oral rim ducts rather numerous	***busiaensis***
7	(1)	Ventral side of each anal lobe with a chitinized bar	8
		Chitinized bar lacking	10
8	(7)	Dorsal oral rim ducts lacking	***bruguierae***
		Dorsal oral rim ducts present	9

9 (8) Spines of the most anterior cerarii long, setolose, not appreciably differentiated from the dorsal body setae . . . . ***diversus***
Spines of all cerarii conical . . . . ***burnerae***
10 (7) Ventral abdominal multilocular disc pores arranged in two or three groups . 11
Multilocular disc pores set in five or six groups 12
11 (10) Circulus large, apparently foldable ; ventral body setae long and rather robust ***kajiadoensis***
Circulus very small ; ventral body setae short and slender . . . ***mutabilis***
12 (10) Hind tibiae with a group of large translucent pores each provided with a strongly chitinized rim . . . . ***limuricus***
Translucent pores on hind tibiae minute in size and without chitinized rim ***tectus***

Paracoccus burnerae (Brain, 1915)

Pseudococcus burnerae Brain, 1915 : 111.
Pseudococcus burnerae Brain ; Brain & Kelly, 1917 : 182.
Pseudococcus ? comstocki Kuwana ; Kirkpatrick, 1927 : 17 [misidentification].
Pseudococcus simulator James, 1933 : 434.
Pseudococcus burnerae Brain ; Munro & Fouché, 1936 : 91.
Pseudococcus burnerae Brain ; Hall, 1937 : 126.
Paracoccus burnerae (Brain) Ezzat & McConnell, 1956 : 39.
Pseudococcus simulator James ; Ezzat & McConnell, 1956 : 106.
Pseudococcus muraltiae Brain ; De Lotto, 1958 : 198 [misidentification].
Pseudococcus burnerae Brain ; De Lotto, 1958 : 89.

KENYA : Nairobi, 15.vi.1950, on *Olea europaea* L. (*R. H. Le Pelley*), 21.i.1951, on *Nerium oleander* L., 24.i.1951, on *Berberis holstii* Engl. (*G. De Lotto*), 3.i.1951, on *Malva* sp. (*R. M. Nattrass*), 14.iii.1951, on *Acokanthera longiflora* Stapf., 26.ii.1951, on *Bauhinia purpurea* L., 3.x.1951, on *Musa ensete* Gmel., 5.i.1956, on *Vernonia* sp. (*G. De Lotto*), 25.x.1956, on *Beaumontia* sp. (*R. H. Le Pelley*), 18.v.1961, on *Asparagus* sp. (*H. Wilkinson*) ; Ruiru, 31.x.1953, on *Indigofera* sp. and *Hibiscus fuscus* Garcke (*G. De Lotto*) ; Namanga, 22.i.1961, on *Ipomoea hildebrandtii* Vatke (*G. De Lotto*).

NORTHERN RHODESIA : Shangombo, 6.viii.1952, on *Combretum zeyheri* Sond. (*H. K. Munro*).

SOUTH AFRICA : Zebediela, 5.ii.1957, on *Coleus* sp. (*G. De Lotto*) ; Pretoria, 16.vii.1954, on *Caralluma caudata* N. E. Brown (*H. K. Munro*).

***Paracoccus busiaensis* sp. n.**

(Plate 8)

Mounted specimens elliptical with anal lobes rather poorly developed ; length up to 2·6 mm. Margin of the body with seventeen pairs of cerarii, at times reduced to sixteen due to the absence of the (xv) pair. Anal lobe cerarii each with two conical spines beset by 15–20 trilocular pores and 2–3 auxiliary setae ; area about the cerarian spines not chitinized. The spines of the remaining cerarii are slightly shorter and more slender than those of the anal lobe cerarii. Each preanal cerarius is built up with two spines, except the (xv) which, where present, is reduced to one spine only. Ventral side of each anal lobe without chitinized bar ; apical seta 190–212μ ; subapical one 44μ. Multilocular disc pores arranged in transverse rows on the ventral midregion of the last six abdominal segments, as follows : (ix plus x) 30–37 ; (viii) 44–48 ; (vii) 35–46 ; (vi) 25–33 ; (v) 30–35 ; (iv) 2–4. A few multilocular pores are scattered on the ventral prosoma and on the dorsal side of the abdomen. Tubular ducts of the oral rim type entirely absent. Tubular ducts with oral collar of two sizes. The larger ones are few and scattered all over the dorsum ; the small ones are set in irregular groupings on the ventral marginal area as far as the head ; others are intermingled with the multilocular pores and scattered on the midregion of the ventral prosoma. Trilocular pores not numerous. Simple disc pores apparently absent. Anterior and posterior dorsal ostioles very poorly developed. Circulus lacking. Dorsal body setae few, very short and slender ; ventral ones slightly longer. Legs well developed ; hind tibiae with a few translucent pores ; dimensions of legs (iii) : trochanter plus femur 241–255μ ; tibia plus tarsus 263–277μ. Anal ring entire, apical, with six setae 117μ long. Beak 110μ. Antennae 8-segmented ; total length 343–365μ.

Holotype. Adult ♀. UGANDA : Busia, 1.ix.1955, on *Coleus* sp. (*T. J. Crowe*). Coll. No. 1885.

Paratypes. 2 adult ♀. Same data as holotype.

***Paracoccus mutabilis* sp. n.**

(Plate 9)

Mounted specimens rather broadly elliptical, with anal lobes fairly well developed ; length up to 2·2 mm. Margin of the body with seventeen pairs of cerarii, at times reduced to sixteen or fifteen, due to the absence of one or two pairs mostly on the thorax. Anal lobe cerarii each with two robust conical spines beset by 15–20 trilocular pores and two auxiliary setae. The spines of the remaining cerarii are progressively more slender and shorter anteriorly, and on the thorax and head they at times attain the same size and shape of the dorsal body setae and tend to be set rather apart from each other. Each cerarius normally bears two spines, but occasionally they are reduced to one spine only. The average number of spines in the specimens of the type series is (i) 1·9 ; (ii) 2 ; (iii) 1·8 ; (iv) 1·7 ; (v) 1·6 ; (vi) 2 ; (vii) 2 ; (viii) 1·9 ; (ix) 1·7 ; (x) 0·6 ; (xi) 1·7 ; (xii) 1·1 ; (xiii) 1·7 ; (xiv) 2 ; (xv) 1·4 ; (xvi) 2·1 ; (xvii) 1·6. Ventral side of each anal lobe without chitinized bar ; apical seta 146–175μ ; subapical one 36–44μ. Multilocular disc pores arranged in transverse rows on the ventral midregion of the last six abdominal segments as follows : (ix plus x) 19–27 ; (viii) 23–30 ; (vii) 20–23 ; (vi) 18–26 ; (v) 20–26 ; (iv) 7–11. No multilocular pores occur on the ventral prosoma or on the dorsum. One single tubular duct of the oral rim type occurs on the dorsum near each frontal cerarius (xvii). Ventral tubular ducts of the oral collar type set in marginal groupings as far as the head ; others are intermingled with the multilocular disc pores and scattered on the midregion of the thorax. Trilocular pores rather few on either side of the body. Simple disc pores noticeably smaller than the trilocular pores, few and sparse. Anterior and posterior dorsal ostioles inconspicuous, with lips membranous. Circulus very small, rounded or slightly elongate transversely, unfoldable. Dorsal setae few, short and slender ; ventral ones slightly longer. Legs normal with some minute translucent pores on the hind coxa and tibia ; dimensions of legs (iii) : trochanter plus femur 241–255μ ; tibia plus tarsus 255–270μ. Anal ring entire, apical, with six setae measuring 88–95μ in length. Beak 95–117μ. Antennae with eight segments ; total length 314–321μ.

Holotype. Adult ♀. SOUTH WEST AFRICA : Walvis Bay, 25.iii.1954, on *Welwitschia mirabilis* Hook. f. (*J. Nel*). Coll. No. 2745.

Paratypes. 4 adult ♀. Same data as holotype.

***Paracoccus pinguis* sp. n.**

(Plate 10)

Mounted specimens broadly elliptical, with anal lobes poorly developed ; length up to 2·2 mm. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each with two conical spines beset with 15 to 20 trilocular pores and two or three—seldom four—auxiliary setae ;

area about the cerarian spines not chitinized. All remaining cerarii normally built up with two spines slightly smaller than those of the anal lobe cerarii. Ventral side of each anal lobe with a small, elongate chitinized area ; apical seta 182–197μ ; subapical one 51–66μ. Multilocular disc pores set in small groups on the ventral midregion of the last three or four abdominal segments ; their number is as follows : (ix plus x) 22–33 ; (viii) 22–28 ; (vii) 5–7 ; (vi) 0–2. No multilocular pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts of the oral rim type very variable in number (2 to 11) and arrangement ; in the holotype specimen they are entirely missing. Ventral tubular ducts of the oral collar type of two sizes, both fairly numerous on all abdominal segments. Trilocular pores not numerous and uniformly distributed on either side of the body. Simple disc pores smaller than the trilocular pores, few and sparse. Anterior and posterior dorsal ostioles inconspicuous with lips membranous. Circulus absent. Dorsal and ventral body setae few, short and slender. Legs well developed ; translucent pores lacking ; dimensions of legs (iii) ; trochanter plus femur 263–292μ ; tibia plus tarsus 285–314μ. Anal ring apical, entire, with six setae 102–117μ long. Beak 146–153μ. Antennae normally 8-segmented, except in two specimens in which one of the antennae was reduced to seven segments only, with a pseudoarticulation on the third segment ; total length 343–372μ.

Holotype. Adult ♀. TANGANYIKA : Mwanza, 20.x.1961, on roots of grass (*G. De Lotto*). Coll. No. 2687.

Paratypes. 2 adult ♀. Same data as holotype.

Paracoccus tectus **sp. n.**

(Plate 11)

Mounted specimens elongate to rather broadly elliptical ; with anal lobes well developed ; length up to 1·9 mm. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each with two conical spines beset with 30–40 trilocular pores and 5–7 auxiliary setae ; area about the cerarian spines not chitinized. Each preanal cerarius bears two spines which become longer and more slender anteriorly ; on the most anterior cerarii they attain the same size and shape of the dorsal body setae. Ventral side of each anal lobe without chitinized bar ; apical seta robust, 248–263μ long ; subapical one 50–55μ. Multilocular disc pores arranged in two or three small groups on the ventral midregion of the last abdominal segments, as follows : (ix plus x) 17–25 ; (viii)17–21 ; (vii) 0–5. No multilocular pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts of the oral rim type present on the abdomen and thorax only, where they tend to be arranged in longitudinal series ; the total number ranges from 14 to 24 ; one to three ducts occasionally occur on the ventral submarginal area of the thorax. Ventral tubular ducts of oral collar type arranged in transverse groups on the midregion and marginal area of all abdominal segments ; a group of 2 to 4 ducts occurs on the head, near the frontal cerarius (xvii). Trilocular pores numerous and uniformly distributed on the dorsum and venter. Simple disc pores noticeably smaller than the trilocular pores, few and scattered on either side of the body. Anterior and posterior dorsal ostioles well developed with lips membranous. Circulus transversally elongate, with surface plain. Dorsal setae rather long and fairly numerous ; ventral ones more abundant and longer. Legs all well developed ; hind tibiae with a few minute translucent pores ; dimensions of legs (iii) : trochanter plus femur 263–300μ ; tibia plus tarsus 307–350μ. Anal ring apical, with six setae 117–131μ long. Beak 117–125μ. Antennae with eight segments ; total length 394–360μ.

Holotype. Adult ♀. UGANDA : North Bugishu, 7.ii.1957, on roots of *Erlangea tomentosa* Moore (*D. N. McNutt*). Coll. No. 2137.

Paratypes. 2 adult ♀. Same data as holotype.

Paracoccus trichinus sp. n.

(Plate 12)

Mounted specimens elongate elliptical, with anal lobes well developed ; length up to 2·2 mm. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each with two robust conical spines beset with 18–25 trilocular pores and 3 to 5 auxiliary setae ; area about the spines not chitinized. In one specimen one of the anal lobe cerarii bears only one spine, and in another specimen the spines are lacking altogether in one cerarius. All remaining cerarii with two spines, except the frontal one (xvii) which at times is built up with three. The spines are somewhat shorter and more slender than those of the anal cerarii. Ventral side of each anal lobe without chitinized bar ; apical seta 204–226μ ; subapical one 58–73μ. Multilocular disc pores set in transverse rows on the ventral side of the last seven abdominal segments as follows : (ix plus x) 28–33 ; (viii) 45–52 ; (vii) 47–54 ; (vi) 48–59 ; (v) 45–57 ; (iv) 12–20 ; (iii) 5–7. A few pores are scattered on the ventral prosoma. Dorsal tubular ducts of the oral rim type few, tending to be set in longitudinal series, but their arrangement and number are very variable ; they occur on the venter and thorax, except in the holotype specimen in which one duct is set close to the frontal cerarius (xvii). Altogether 11 to 23 ducts were found on the specimens of the type series. Ventral tubular ducts of the oral collar type arranged in irregular groupings on the marginal area of all abdominal segments ; a small group of pores occurs on the ventral marginal area near the (xiii) and (xvii) cerarii ; other ducts are associated with the ventral abdominal multilocular disc pores. Trilocular pores numerous on either side of the body. Simple disc pores few and sparse. Anterior and posterior dorsal ostioles well developed with lips membranous. Circulus absent. Dorsal setae rather few, short and slender ; ventral ones more numerous, long and robust. Legs well developed ; hind tibiae with a few small translucent pores ; dimensions of legs (iii) : trochanter plus femur 270–300μ ; tibia plus tarsus 314–336μ. Anal ring apical, cellular, with six setae 124–146μ long. Beak 102–117μ. Antennae with 8 segments measuring together 358–387μ.

Holotype. Adult ♀. UGANDA : North Bugishu, 5.ii.1957, on roots of *Galinsoga* sp. (*D. N. McNutt*). Coll. No. 2136.

Paratypes. 4 adult ♀. Same data as holotype.

Other records of the same species on material not included in the type series, are : UGANDA : North Bugishu, 6.ii.1957, on roots of *Cynura* sp., 27.ii.1957, on roots of *Dichrocephala integrifolia* D. C. (*D. N. McNutt*).

PARAPUTO Laing, 1929

Paraputo Laing, 1929 : 473.

Type species : *Paraputo ritchiei* Laing, 1929 = *Ripersia anomala* Newstead, 1908.

This genus was erected by Laing (1929) for *P. ritchiei* which has been recently synonymized with *Ripersia anomala* Newstead, 1908, by Williams (1958*a*) who had the opportunity to study the types of both species.

In addition to the type species, the following species are apparently referable to the genus *Paraputo* : *Ripersia glandulifera* Newstead, 1912, described from South West Africa on specimens collected on *Adiantum* sp. ; *Pseudococcus mazoeensis* Hall, 1937, from Southern Rhodesia on *Acacia* sp. and *Zizyphus jujuba* Lam. ; and *Paraputo barbatus* here described as new.

Provisional Key to Species

1	Antennae 6-segmented	2
	Antennae with seven or eight segments	3
2 (1)	Frontal and preocular cerarii always present	***anomalus***
	Frontal and preocular cerarii lacking	***glandulifer***
3 (1)	Multilocular disc pores on the ventral midregion of the abdomen set in five groups	***mazoeensis***
	Multilocular disc pores arranged in two or three groups only	***barbatus***

Paraputo anomalus (Newstead, 1908)

Ripersia anomala Newstead, *in* Sjöstedt, 1908 : 9.
Ripersia anomala Newstead ; Lindinger, 1913 : 68.
Paraputo ritchiei Laing, 1929 : 473.
Paraputo multispinosa James, 1935 : 233.
Paraputo ritchiei Laing ; Strickland, 1947 : 512.
Paraputo ritchiei Laing ; Ferris, 1955 : 5.
Paraputo ritchiei Laing ; De Lotto, 1957 : 188.
Paraputo anomala (Newstead) Williams, 1958 : 217.
Paraputo anomala (Newstead) ; Williams, 1958a : 21.

The synonymy of this species was first studied by Strickland (1947), who found *Paraputo multispinosa* James, 1935 to be the same species described by Laing (1929) as *P. ritchiei*. According to Williams (1958) the latter is a synonym of *Ripersia anomala* Newstead, 1908.

Although widely distributed in East Africa, the species apparently does not rank as a pest of any economic importance.

KENYA : Nairobi, 27.viii.1958, on *Acacia* sp. (*G. De Lotto*).

TANGANYIKA : Arusha, 25.i.1961, on *Pterolobium lacerans* R. Br. (*G. De Lotto*).

UGANDA : Sebei, 2.iii.1957, on roots of *Musa* sp. (*D. N. McNutt*) ; Kampala, 23.vii.1961, on *Eugenia* sp. (*G. De Lotto*).

***Paraputo barbatus* sp. n.**

(Plate 13)

Young adult females obovate, with anal lobes and lateral margins of the three preceding abdominal segments very broadly rounded ; length up to 2·6 mm. Marginal cerarii recognizable only on the last five abdominal segments. Anal lobe cerarii each with 30–40 conical spines arranged in a band 2–4 spines wide along the margin of the lobe ; among the spines are intermingled some trilocular pores ; area about the spines not chitinized ; auxiliary setae absent. Remaining cerarii similar to those of the anal lobes, except that the number of spines tends to be progressively smaller anteriorly. Ventral side of each anal lobe with a well developed elongate chitinized bar ; apical seta short and robust, 146–160μ long ; subapical one 73–80μ. Multilocular disc pores set in two, occasionally three, small groups on the ventral midregion of the last abdominal segments. Their number is as follows : (ix plus x) 5–8 ; (viii) 11–21 ; (vii) 0–3. Tubular ducts of the oral collar type very few on the ventral side of the anal lobes and marginal area of the preceding segment. Trilocular pores very numerous on either side of the body. Simple disc pores somewhat smaller than the trilocular pores, few and scattered on the dorsum and venter. Anterior and posterior dorsal ostioles prominent with lips moderately chitinized. Circulus transversely elongate. Dorsal setae very short, numerous ; cisanal setae and a few setae set on either side of the anal ring longer and robust ; ventral setae also numerous and similar to those of the dorsum, except on the last two abdominal segments where they are longer and stouter. Legs short, stout, without translucent pores ; dimensions of legs (iii) : trochanter plus femur 248–255μ ; tibia plus tarsus 182–197μ. Beak 204–219μ. Anal ring normal, apical, with six setae 73–80μ long. Antennae 7- or 8-segmented ; where the antennae are reduced to seven segments, one of them is marked with a pseudoarticulation ; total length 306–328μ.

Holotype. Adult ♀. TANGANYIKA : Longido, 23.i.1961, on *Acacia* sp. (*G. De Lotto*). Coll. No. 2609.

Paratypes. 2 adult ♀. Same data as holotype.

PELIOCOCCUS Borchsenius, 1948

Peliococcus Borchsenius, 1948 : 954.

Type species : *Phenacoccus chersonensis* Kiritshenko, 1936.

The type species of the genus, *Phenacoccus chersonensis* Kiritshenko, 1936, is palaearctic and entirely unknown to me, therefore the characters of this genus had to be based on the diagnosis of two congeneric North American forms dealt with by Ferris (1950).

Three species from the region under review are apparently referable to *Peliococcus*. They are : *Pseudococcus bantu* Brain, 1915, from roots of grass, South Africa ; *Phenacoccus locustus* James, 1936, from roots of *Hyparrhenia ruprechtii* Fourn. and *P. trispinosus* James, 1936, from roots and rhizomes of *Solanum tuberosum* L. the last two having been described from Kenya. To them should be added *Peliococcus orophilus*, a species somewhat atypical, here described as new.

PROVISIONAL KEY TO SPECIES

1	Clusters of large multilocular disc pores numerous and distributed all over the body	2
	Clusters of multilocular disc pores few on either side of the abdomen only	***orophilus***
2 (1)	Circulus lacking	***locustus***
	Circulus present	3
3 (2)	Large multilocular disc pores in clusters of two to three, seldom four ; hind tibiae with some translucent pores	***bantu***
	Large multilocular pores arranged in clusters of five to eight ; hind tibiae without translucent pores	***trispinosus***

Peliococcus bantu (Brain, 1915) **comb. n.**

Pseudococcus bantu Brain, 1915 : 137.
Pseudococcus bantu Brain ; Munro & Fouché, 1936 : 91.
Pseudococcus bantu Brain ; De Lotto, 1958 : 84.

Originally described (Brain, 1915) from Pietermaritzburg, Natal, South Africa, as living on crowns of grass. The following record is from Transvaal.

SOUTH AFRICA : Klaserie, 20.iv.1955, on roots of grass (*E. C. G. Bedford*).

Peliococcus orophilus sp. n.

(Plate 14)

Mounted specimens elongate, with anal lobes prominent ; length up to 3·1 mm. Margin of the body with a complete series of eighteen pairs of cerarii. Anal lobe cerarii each with three slender conical spines set rather apart from one another and surrounded by a loose group of 15–20 trilocular pores and two or three very short spiniform auxiliary setae ; area about the cerarian spines not chitinized. Remaining cerarii each built up with two spines similar to those of the anal lobe cerarii, or slighter, longer and somewhat more slender ; each cerarius is beset with six to ten trilocular pores but devoid of auxiliary setae. Ventral side of each anal lobe with an ill-shaped elongate chitinized bar, at times reduced in size owing to the absence of the tract between the attachments of the apical and subapical setae ; apical seta robust, 292–336μ long ; subapical one 146–175μ. Multilocular disc pores few on the ventral midregion of the last three abdominal segments.[6] Other multilocular pores, at times slightly larger than those occurring on the ventral abdominal segments, are set in groups of two to four. Each group of pores has associated with it one or two small tubular ducts of oral collar type. These clusters of pores occur on either side of the abdomen only, and their number and arrangement are very variable. Quinquelocular pores fairly numerous on the ventral median and submedian areas, and distributed without any regular pattern. Tubular ducts of oral collar type set in small groups on the ventral marginal area of all abdominal segments ; others are intermingled among the ventral multilocular disc pores. Trilocular pores few and sparse on both sides of the body. Simple disc pores apparently lacking. Anterior and posterior dorsal ostioles well developed with lips membranous. Circulus large. Dorsal setae short, spiniform, very few ; a few setae similar in size and shape to those of the marginal cerarii are set in pairs and beset with some trilocular pores, giving the appearance of supplementary dorsal cerarii. Ventral body setae much more numerous, fairly long. Legs all well developed ; claws with a denticle ; translucent pores absent ; dimensions of legs (iii) : trochanter plus femur 438–496μ ; tibia plus tarsus 533–606μ. Anal ring entire, apical, with six setae 160–190μ long. Beak dimerous 146–168μ. Antennae with nine segments, measuring together 650–695μ.

Holotype. Adult ♀. TANGANYIKA : Mount Kilimanjaro (altitude not recorded), iii.1951, on *Senecio* sp. (*R. G. Tapley*). Coll. No. 1669.

Paratypes. Seven adult ♀. Same data as holotype.

Peliococcus trispinosus (James, 1936) **comb. n.**

Phenacoccus trispinosus James, 1936 : 206.
Phenacoccus trispinosus James ; De Lotto, 1957 : 191.

KENYA : Nairobi, 13.iii.1956, on roots of *Panicum maximum* Jacq. (*G. De Lotto*).

PHENACOCCUS Cockerell, 1893

Phenacoccus Cockerell, 1893 : 318.

Type species : *Pseudococcus aceris* Signoret, 1875.

The composition of the genus *Phenacoccus* is still far from satisfactory. In the writer's view only three species from Africa south of the Sahara are structurally congeneric with the type. They are : *Pseudococcus stelli* Brain, 1915, and *Pseudococcus graminosus* McKenzie, 1960, both occurring in South Africa ; and *Phenacoccus*

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[6] The number of multilocular disc pores occurring on each segment could not be satisfactorily counted owing to distortions of the body skin.

madeirensis Green, 1928, recently recorded by Williams (1958) from Ghana and Nigeria. The generic assignment of all remaining species, including those described as new in the following pages, is entirely provisional.

***Phenacoccus cotyledonis* sp. n.**

(Plate 15)

Mounted specimens elongate, up to 1·2 mm. long. Marginal cerarii present only on the anal lobe segment. Each cerarius is formed with two rather slender spines surrounded by 5–8 trilocular pores ; auxiliary setae absent ; area about the spines not chitinized. Ventral side of each anal lobe without chitinized bar ; apical seta 80–95µ ; subapical one not differentiated from the remaining ventral body setae. Multilocular disc pores arranged in loose transverse rows on the ventral side of the last five abdominal segments as follows : (ix plus x) 10–15 ; (viii) 8–15 ; (vii) 11–19 ; (vi) 9–20 ; (v) 4–10. No multilocular pores occur on the ventral prosoma or on the dorsum. Quinquelocular pores entirely absent. Tubular ducts of oral collar type of two sizes. The larger ones are not numerous and tend to be arranged in loose, irregular transverse rows on either side of the abdomen ; a few more are scattered on the dorsal prosoma. Tubular ducts of smaller size very few on the dorsal and ventral side of the abdomen only. Trilocular pores few. Simple disc pores smaller than the trilocular pores, few and sparse. Anterior and posterior dorsal ostioles fairly prominent with lips membranous. Circulus lacking. Dorsal and ventral body setae few, short and slender. Legs well developed ; claws with a minute denticle ; hind tibiae with numerous translucent pores ; dimensions of legs (iii) : trochanter plus femur 146–168µ ; tibia plus tarsus 175–183µ. Anal ring very narrow with a few elongate cells ; opened posteriorly, and provided with six slender setae 22–29µ long. Beak 88–95µ. Antennae 8-segmented with a pseudoarticulation on the apical segment ; total length 212–248µ.

Holotype. Adult ♀. SOUTH AFRICA : Pretoria, vii.1959, on *Cotyledon* sp. (*J. S. Odendaal*). Coll. No. 2505.

Paratypes. Four adult ♀. Same data as holotype.

This species has some affinity with *Ph. trionymoides* De Lotto, 1961, and *Ph. distinctus* here described as new. It differs, however, from both in having the marginal cerarii reduced to one pair only, and in having the anal ring very narrow and slightly opened posteriorly.

***Phenacoccus distinctus* sp. n.**

(Plate 16)

Mounted specimen holotype elongate, with anal lobes fairly well developed ; length 2·3 mm. Marginal cerarii present only on the last two abdominal segments. Anal lobe cerarii each with two conical spines beset with six auxiliary setae and about 40 trilocular pores ; area about the cerarian spines not chitinized. Preanal cerarii with two spines slightly smaller than those of the anal lobe cerarii. Ventral side of each anal lobe without chitinized bar ; apical seta 168µ ; subapical one about half as long. Multilocular disc pores arranged in transverse rows on the midregion of the last five abdominal segments ; the number of pores is as follows : (ix plus x) 94 ; (viii) 113 ; (vii) 115 ; (vi) 104 ; (v) 62. Other multilocular pores are scattered on the ventral prosoma and on the dorsum. Tubular ducts of three sizes. The ducts of the largest size are simple, that is without oral collar or oral rim, and slightly extrude from the body integument ; these ducts are arranged in loose, irregular rows on the dorsal side of the abdomen and thorax ; others are scattered on the dorsal side of the head and on the ventral marginal area of the abdomen and thorax. Medium-sized ducts very numerous on either side of the body ; on the dorsal side of the abdomen and thorax they are set in transverse segmental rows. Ducts of the smaller size fairly abundant on the dorsum and venter in association with the medium-sized ones. Quinquelocular pores absent. Trilocular pores not numerous and uniformly distributed. Simple disc pores apparently absent. Anterior dorsal ostioles not recognizable ; posterior ones poorly developed with lips membranous. Circulus lacking. Dorsal setae short and slender ; ventral ones long and fairly robust. Legs well developed with a denticle on the claws ; hind tibiae with a few small translucent pores ; dimensions of legs (iii) : trochanter plus femur 372µ ; tibia plus tarsus 372µ. Anal ring apical, entire, with six setae measuring 117µ. Beak dimerous, 131µ. Antennae 8-segmented with a pseudoarticulation on the apical segment ; total length 496µ.

Holotype. Adult ♀. SOUTH AFRICA : Bonnievale, 23.iv.1938, on *Galenia africana* L. (kraalbos) (*P. Joubert*). Coll. No. 2706.

This species resembles very closely *Ph. trionymoides* De Lotto, 1961, described from Kenya, Nairobi, on *Carallumma drummeri*, from which it differs in having a conspicuously larger number of multilocular disc pores and tubular ducts. The large simple ducts which in *trionymoides* are arranged in fairly regular longitudinal series, in *distinctus* tend to be set in segmental transverse rows. Furthermore in the latter the antennae, legs, apical seta and beak are noticeably longer than in the former.

Phenacoccus graminosus McKenzie, 1960

(Plate 17)

This species has been recently described from California, U.S.A., and South Australia (McKenzie, 1960). The following redescription is based on six mounted adult females from South Africa which were compared with two specimens of the type series.[7]

Mounted specimens elongate elliptical, with anal lobes fairly well developed ; length up to 3·5 mm. Margin of the body with a complete series of eighteen pairs of cerarii. Anal lobe cerarii each with two conical spines beset with 20–25 trilocular pores and three, occasionally four, spiniform auxiliary setae. These setae are minute, except one which at times is nearly as large as the cerarian spines. Spines of all remaining cerarii shorter and more slender than those of the anal lobe cerarii. Each preanal cerarius is formed with two spines, except the ocular (xvi), frontal (xviii) and, occasionally, the preocular (xvii) cerarii, each of which bears three spines. Ventral side of each anal lobe without chitinized bar ; apical seta 183–204 [190–204]µ;[8] subapical one 73–87 [73–80]µ. Multilocular disc pores numerous on either side of the abdomen ; others are scattered on the ventral and dorsal side of the prosoma. On the ventral side of the (iv) to (vi) abdominal segments the multilocular pores are arranged in median and marginal groups. The number of pores on the ventral side of the last six abdominal segments is as follows : (ix plus x) 57–71 [69–93] ; (viii) 87–108 [107–139] ; (vii) 91–103 [108–123] ; (vi) 69–84 [89–121] ; (v) 73–87 [89–121] ; (iv) 29–46 [69–85]. On the dorsal side of the abdomen the number of pores is : (ix) none ; (viii) 25–33 [32–43] ; (vii) 15–23 [21–36] ; (vi) 42–55 [45–81] ; (v) 19–31 [35–56] ; (iv) 4–10 [16–33]. Tubular ducts of the oral rim type entirely absent. Tubular ducts with oral collar present on both sides of the body. Those occurring

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[7] U.S.A.: California, paratype No. 53 J 165, San Pablo, Contra Costa County, 10.x.1953, on ryegrass (*D. J. Bingham*) ; paratype No. 59 D 15–37, Sunnyvale, Santa Clara County, 7.iv.1959, on lawngrass (*T. R. Haig & E. Winkler*).

[8] The figures in square brackets are the values found in the two specimens of the type series.

on the dorsum are slightly larger in diameter ; they are few and scattered, except on the marginal area of the last three abdominal segments where they are set in small groupings. On the venter numerous ducts are associated with the abdominal multilocular disc pores. Quinquelocular pores distributed on the ventral midregion from the (vii) or (vi) abdominal segment as far as the prothorax. Trilocular pores not numerous and uniformly distributed on both sides of the body. Simple disc pores noticeably smaller than the trilocular pores, few and sparse. Anterior and posterior dorsal ostioles rather inconspicuous with lips membranous. Circulus situated in the middle of the (iv) abdominal segment, transversely elongate, with surface membranous. Dorsal setae very small, spiniform, few and scattered ; ventral ones long and robust. Legs well developed with a small denticle on the claws ; translucent pores lacking ; dimensions of legs (iii) : trochanter plus femur 300–350 [340–350] μ ; tibia plus tarsus 358–430 [409–416] μ. Anal ring entire, apical, with six setae measuring 102–117 [131–139] μ. Beak 95–103 [95–110] μ. Antennae 9-segmented ; total length 416–467 [489–540] μ.

SOUTH AFRICA : Stellenbosch, 14.iv.1938, on grass (*R. I. Nel*). Coll. No. 2488. One specimen will be deposited in the collection of the British Museum (Natural History), London.

As far as the paratypes seen are concerned, the South African material is structurally identical with the species described by McKenzie from California. There are, however, noticeable differences in the number of multilocular disc pores and in the length of legs, antennae and anal ring setae, which, in view of the discontinuity between the two areas of distribution, may well have a taxonomic significance and thus justify, if confirmed, the recognition of a geographic subspecies.

***Phenacoccus orcinus* sp. n.**

(Plate 18)

Mounted specimens elliptical with anal lobes poorly developed ; length up to 2·9 mm. Margin of the body with altogether twenty-four pairs of cerarii, of these, eighteen pairs represent the normal series, whilst the remaining are interspersed on the last six abdominal segments anterior to the anal lobes. Anal lobe cerarii each formed with two robust, somewhat lanceolate spines surrounded by 20–30 trilocular pores and two to four small lanceolate auxiliary setae ; area about the cerarian spines not chitinized. All remaining cerarii of the normal series built up with two lanceolate spines, except the ocular cerarius (xvi) which has three, occasionally four, spines. The spines are slightly smaller than those of the anal lobe cerarii and are beset with 6–10 trilocular pores and devoid of auxiliary setae. The additional cerarii on the last two abdominal segments anterior to the anal lobes are similar to those of the normal series, although at times the spines are somewhat different in size ; the remaining four supplementary cerarii are reduced to one spine only. Ventral side of each anal lobe with a minute, irregularly shaped chitinized bar in front of the subapical seta ; apical seta robust, 175–212 μ long ; subapical one 95–102 μ. Multilocular disc pores set in three or four groups in the midregion of the last abdominal segments as follows : (ix plus x) 5–14 ; (viii) 21–31 ; (vii) 12–19 ; (vi) 0–6. On the segments anterior to the genital opening the pores are set in loose transverse rows along the distal margin only. No pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts entirely absent. Ventral tubular ducts of the oral collar type very few on the marginal area of all abdominal segments ; a few are scattered on the midregion of the abdomen. Quinquelocular pores totally lacking. Trilocular pores not numerous and evenly distributed all over the body. Simple disc pores smaller than the trilocular ones, very few on either side of the body. About twenty simple disc pores are set in an irregular transverse group on the dorsum, near the basal margin of the last abdominal segment. Anterior and posterior dorsal ostioles rather inconspicuous with lips membranous. Circulus absent. Dorsal setae small, lanceolate in shape, at times beset with one to three trilocular pores ; ventral setae long and slender, rather few. Legs normal with a denticle on the claws ; translucent pores absent ; dimensions of legs (iii) : trochanter plus femur 270–282μ ; tibia plus tarsus 321–350μ. Anal ring entire, with six setae 95–117μ long. Beak 95–110μ. Antennae with nine segments ; total length 357–402μ.

Holotype. Adult ♀. South Africa : Stellenbosch, 28.viii.1921, on roots of grass (*C. J. Joubert*). Coll. No. 2643.

Paratypes. Four adult ♀. Same data as holotype.

The supplementary series of marginal cerarii on the last abdominal segments anterior to the anal lobes is a distinctive feature among all species still retained in the genus *Phenacoccus* known to the writer.

Phenacoccus pauculus **sp. n.**

(Plate 19)

Mounted specimens elongate elliptical, up to 1·6 mm. long. Margin of the body with eighteen pairs of cerarii. Anal lobe cerarii each with two conical spines beset with 6 to 8 trilocular pores ; auxiliary setae lacking ; area about the spines not chitinized. The spines of the remaining cerarii attain the same size as those of the anal lobe cerarii, but are slightly more slender. Each preanal cerarius carries two spines, except one or two cerarii on the thorax which at times are reduced to one spine only ; and the three most anterior cerarii (xvi) to (xviii) which are normally built up with three spines. Each cerarius is surrounded by 3–6 trilocular pores. Ventral side of each anal lobe without chitinized bar ; apical seta 168–183μ ; subapical one 88–110μ. Multilocular disc pores set in transverse groups on the ventral side of the last five abdominal segments as follows : (ix plus x) 50–51 ; (viii) 74–77 ; (vii) 53–58 ; (vi) 15–26 ; (v) 4. A few pores occur on the dorsal side of the last two abdominal segments. Quinquelocular pores very few on the ventral midregion of the thorax and head. Tubular ducts with oral collar rim very numerous on either side of the body. Tubular ducts of the oral collar type rather few on the ventral midregion and marginal area of the last five abdominal segments. Trilocular pores fairly numerous and uniformly distributed. Simple disc pores smaller than the trilocular pores, few and scattered on both surfaces of the body. Anterior and posterior dorsal ostioles well developed with lips membranous. Circulus absent. Dorsal setae very short, spiniform ; ventral ones much longer, rather robust. Legs well developed with a small denticle on the claws ; hind coxae with a few very minute translucent pores ; dimensions of legs (iii) : trochanter plus femur 226–234μ ; tibia plus tarsus 270–285μ. Anal ring entire, cellular, with six setae measuring 73–88μ in length. Beak 81–88μ. Antennae 8-segmented with a pseudoarticulation on the apical segment ; total length 336–358μ.

Holotype. Adult ♀. Uganda : Kampala, 23.vii.1961, on roots of grass (*G. De Lotto*). Coll. No. 2681.

Paratype. One adult ♀. Same data as holotype.

This is the second African species of *Phenacoccus* with oral rim tubular ducts, the other being *Pseudococcus nitidus* Brain, 1915, described from specimens collected on *Acacia caffra* Willd. in Pretoria, South Africa. The two species are easily separable on the basis of the number of marginal cerarii, which in *nitidus* are reduced to five pairs on the last abdominal segments.

PLANOCOCCOIDES Ezzat & McConnell, 1956

Planococcoides Ezzat & McConnell, 1956 : 53.

Type species : *Pseudococcus njalensis* Laing, 1929.

Structurally this genus represents a link between *Planococcus* Ferris, 1950, in which the cerarii are normally formed from two spines, and *Cataenococcus* Ferris, 1955, in which the cerarian spines tend to be arranged in a continuous series all along the margin of the body.

A species congeneric with *njalensis* is *Planococcoides ireneus* n. n. (= *Pseudococcus latipes* De Lotto, 1955 [*non* Green, 1917]), which differs from the former in having some multilocular disc pores scattered on the ventral prosoma and on the dorsum.

***Planococcoides ireneus* n. n.** De Lotto, 1963

Pseudococcus latipes De Lotto, 1955 : 271. [*non* Green, 1917]

Following the conclusions of Williams (1962) on the identity and present status of the mealy bug originally described by Green in 1917 as *Pseudococcus longispinus* var. *latipes*, *Pseudococcus latipes* De Lotto, 1955 becomes a primary homonym of Green's species and the new name *Planococcoides ireneus* is here proposed.

Since first described in 1955, several lots of specimens have been received from Uganda from both arabica and robusta coffee, indicating that this species is fairly common in that country. A large percentage of the material seen was collected on the roots or on the collar region of the host, under or just above ground level.

UGANDA : North Bugishu, 19.xii.1956, on *Coffea arabica* L. (*D. N. McNutt*).

Planococcoides njalensis (Laing, 1929)

Pseudococcus njalensis Laing, 1929 : 472.
Pseudococcus exitiabilis Laing, 1944 : 91.
Pseudococcus njalensis Laing ; Hall, 1945 : 305.
Pseudococcus njalensis Laing ; Strickland, 1947 : 507.
Planococcoides njalensis (Laing) Ezzat & McConnell, 1956 : 55.
Planococcoides njalensis (Laing) ; Williams, 1958 : 21.

A detailed study of the identity of this species was made by Hall (1945), who examined an extensive range of material collected on several host plants in western Africa, including the types of both *njalensis* and *exitiabilis*. He came to the conclusion that the species is extremely variable and there is no morphological ground for a specific distinction between *njalensis* and *exitiabilis*.

According to him, one of the most variable characters is the number of the cerarian spines. The specimens at hand from the Congo show a noticeable reduction in the number of spines occurring on some cerarii. The following is the average found in 24 specimens : (i) 2·1 ; (ii) 4·1 ; (iii) 3·3 ; (iv) 3 ; (v) 2·7 ; (vi) 2·6 ; (vii) 2·4 ; (viii) and (ix) 2 ; (x) 1·8 ; (xi), (xii) and (xiii) 2 ; (xiv) 1·3 ; (xv) 0·7 ; (xvi) 2·9 ; (xvii) 2·3 ; (xviii) 1·8. In all other structures the material agrees adequately with Ezzat & McConnell's redescription and diagram, as well as with specimens from Ghana collected on *Cola acuminata* and *Theobroma cacao*.

CONGO : Rutshuru, 5.vii.1937, on *Coffea arabica* (*J. Ghesquière*). Coll. Nos. 138 and 142. Two specimens have been deposited in the British Museum (Natural History), London ; two in the U.S. National Collection, Washington, D.C.

PLANOCOCCUS Ferris, 1950

Planococcus Ferris, 1950 : 164.

Type species : *Dorthesia citri* Risso, 1813.

Three more new species are to be added to those already recorded or described from Africa south of the Sahara. The rapid increase of species, often very closely related, strongly suggests that the genus may be of African origin.

PROVISIONAL KEY TO SPECIES

1		All cerarii normally built up with two spines only	2
		Some of the cerarii anterior to the anal lobe ones either with 3–4 spines or with 1–2 auxiliary setae	13
2	(1)	Ventral marginal area of the body with groupings of oral collar ducts extending as far as the prothorax or the head	3
		Ventral marginal ducts either absent or occurring in small groups on the abdominal segments only	10
3	(2)	Circulus lacking	***euphorbiae***
		Circulus present	4
4	(3)	Anal lobe cerarii enclosed within a well marked chitinized area	***kenyae***
		Area about the anal lobe cerarii not chitinized	5
5	(4)	Some of the dorsal setae long, robust and strongly bifurcate	***subterraneus***
		Dorsal setae short, slender and finely pointed	6
6	(5)	Spines of the marginal cerarii longer and more slender than those of the anal lobe cerarii, strongly flagellate	***flagellatus***
		Spines of all cerarii not appreciably differentiate in size and shape	7
7	(6)	Dorsum with some multilocular disc pores and with numerous oral collar ducts arranged in segmental transverse rows	***epulus***
		Multilocular disc pores never occurring on the dorsum ; dorsal oral collar ducts when present never arranged in transverse rows	8
8	(7)	Dorsal marginal area of the abdominal segments anterior to the anal lobes with 1 to 4 oral collar ducts	***kraunhiae***
		Dorsal marginal oral collar ducts either lacking or reduced to one only	9
9	(8)	With a small group of ventral oral collar ducts between the (x) and (ix) abdominal segments ; ventral marginal ducts not appreciably differentiate in size from those on the midregion of the abdomen	***citri***[9]
		Ventral marginal oral collar ducts between the (x) and (ix) abdominal segments lacking ; ventral marginal ducts noticeably larger than those occurring on the ventral midregion of the abdomen	***nigritulus***
10	(2)	Ventral marginal oral collar ducts lacking	11
		Ventral marginal ducts set in small groupings on the last four or five abdominal segments	12
11	(10)	Hind legs without translucent pores ; simple disc pores large and occurring on either side of the body	***hospitus***
		Coxae and tibiae of hind legs with translucent pores ; simple disc pores apparently absent	***hosnyi***

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[9] Inclusive of *citricus* Ezzat & McConnell, 1956, and *ficus* (Signoret, 1875). See p. 373.

12 (10) Multilocular disc pores on the two or three abdominal segments anterior to the genital opening partly arranged in linear rows along the distal margin and partly scattered over the surface of the segment involved ; hind legs without translucent pores . . . . ***aemulor***

Multilocular disc pores anterior to the genital opening set in transverse linear rows along the distal margin only ; coxae and tibiae of the hind legs with translucent pores . . . . ***subukiaensis***

13 (1) Cerarii anterior to the anal lobes situated at the apex of a small slightly chitinized tubercle ; dorsal setae at times associated with one or two trilocular pores ***boafoensis***

Marginal cerarii situated as normal ; dorsal body setae never associated with trilocular pores 14

14 (13) Marginal cerarii at times with one or two auxiliary setae 15

Abdominal cerarii anterior to the anal lobes partly built up with 3–4 spines . 16

15 (14) Anal lobe cerarii enclosed within a chitinized area ; ventral multilocular disc pores in five groups . . . . ***celtis***

Area about the anal lobe cerarii not chitinized ; ventral multilocular pores in three groups . . . . ***rotundatus***

16 (14) Anal lobe cerarii enclosed within a well marked chitinized area ; simple disc pores of two sizes ; ventral multilocular disc pores in three small groups ; trilocular pores few . . . . ***formosus***

Area about the anal lobe cerarii not chitinized ; simple disc pores of one size ; ventral multilocular pores in five groups ; trilocular pores numerous . ***crassus***

***Planococcus aemulor* sp. n.**

(Plate 20)

Mounted specimens broadly elliptical, with anal lobes well developed ; length up to 1·9 mm. Margin of the body with a complete series of eighteen pairs of cerarii. Anal lobe cerarii each with two conical spines which are surrounded by 7 to 10 trilocular pores and devoid of auxiliary setae ; area about the cerarian spines not chitinized. All remaining cerarii also with two spines, except the frontal (xviii) and the preocular (xvii) cerarii each of which occasionally carries three spines. Ventral side of each anal lobe with an elongate irregularly shaped chitinized bar, at times reduced in size due to the absence of the tract between the attachments of the apical and subapical setae ; apical seta robust, 255–265μ ; subapical one 58–73μ. Multilocular disc pores arranged in transverse rows on the ventral side of the last five abdominal segments, as follows : (ix plus x) 22–44 ; (viii) 30–44 ; (vii) 36–48 ; (vi) 21–33 ; (v) 18–28. No multilocular pores occur on the ventral prosoma or on the dorsum. Tubular ducts of oral collar type all attaining the same size ; they are set in small groups on the ventral marginal area of the last four or five abdominal segments anterior to the genital opening ; one or two ducts at times occur on the ninth segment ; a few more ducts are associated with the multilocular disc pores. Trilocular pores fairly numerous on either side of the body. Simple disc pores somewhat larger than the trilocular pores, few and sparse on dorsum and venter. Anterior and posterior dorsal ostioles prominent with lips slightly chitinized. Circulus large with surface membranous. Dorsal setae short and slender, rather numerous ; ventral ones slightly longer. Legs well developed ; translucent pores on hind legs lacking ; dimensions of legs (iii) : trochanter plus femur 263–284μ ; tibia plus tarsus 270–284μ. Anal ring entire, cellular, bearing six setae 80–95μ long. Beak 168–182μ. Antennae with 7 or 8 segments ; in 7-segmented antennae the 4th segment is normally marked with a pseudoarticulation ; total length 343–387μ.

Holotype. Adult ♀. KENYA : Ruiru, 20.viii.1957, on *Combretum splendens* Engl. (*R. H. Le Pelley*). Coll. No. 2224.

Paratypes. Nine adult ♀. Same data as holotype.

The following record is based on specimens not included in the type series :

KENYA : Turbo, 12.xii.1942, on *Asparagus* sp. (*R. H. Le Pelley*).

This species is extremely close to *Planococcus citri* from which, however, it differs in having the ventral marginal groupings of oral collar ducts on the abdominal segments only. In the common citrus mealy bug, groups of these ducts always extend as far as the prothorax and head, as shown in the diagram by Ezzat & McConnell (1956).

Planococcus citri (Risso, 1813)

Pseudococcus citri (Risso) ; Brain, 1912 : 178.
Pseudococcus citri (Risso) ; Lindinger, 1913 : 68.
Pseudococcus citri (Risso) ; Lindinger, 1913 : 100.
Dactylopius (*Pseudococcus*) *citri* (Risso) ; Gowdey, 1914 : 247.
Pseudococcus citri (Risso) ; Brain, 1915 : 115.
Pseudococcus citri phenacocciformis Brain, 1915 : 116.
Pseudococcus citri (Risso) ; Green, 1916 : 375.
Pseudococcus citri (Risso) ; Newstead, 1917 : 126.
Pseudococcus citri (Risso) ; Brain & Kelly, 1917 : 182.
Pseudococcus citri (Risso) ; Gowdey, 1917 : 187.
Pseudococcus citri (Risso) ; De Seabra & Vayssière, 1918 : 163.
Pseudococcus citri Boisduval [*sic*] ; De Seabra, 1922 : 15.
Pseudococcus citri (Risso) ; Ghesquière, 1927 : 311.
Pseudococcus citri (Risso) ; Kirkpatrick, 1927 : 18.
Pseudococcus citri (Risso) ; Laing, 1928 : 214.
Pseudococcus citri (Risso) ; James, 1933 : 433.
Pseudococcus citri (Risso) ; Munro & Fouché, 1936 : 92.
Pseudococcus citri phenacocciformis Brain ; Munro & Fouché, 1936 : 92.
Pseudococcus citri (Risso) ; Hall, 1937 : 126.
Pseudococcus citri (Risso) ; Strickland, 1947 : 505.
Planococcus citri (Risso) ; Ezzat & McConnell, 1956 : 65.
Planococcus citri (Risso) ; De Lotto, 1958 : 94.

Discussing the identity of this species, Ferris (1950) pointed out that the considerable range of variation normally observed in *citri* very likely represents a complex of different ecological, biological or geographical races, phenotypically very closely related to one another. The study of the material available from Africa fully supports his views.

Ezzat & McConnell (1956) redescribed *Dactylopius ficus* Signoret, 1875, which they studied on material from various parts of the world, including specimens collected on grape berry in South Africa. According to them Signoret's species differs from *citri* in having a small group of multilocular disc pores near the attachment of the front legs and near the posterior stigmatic openings ; the multilocular pores on the ventral side of the abdomen are arranged in rows one pore wide, which on segments (iv) and (v) are often interrupted on the median area ; furthermore in *ficus* there are fewer ventral oral collar ducts than in *citri*. In the same paper they described as new *Planococcus citricus* of which they had at hand a long series of specimens, including two collected on roots of *Dioscorea sp.* in Nigeria, intercepted in New York (U.S.A.). This species, too, is very close to *citri*, from which however it differs in such characters as shorter legs and antennae, fewer trilocular pores, tubular ducts and multilocular disc pores. Among the African material examined in connection with this paper are specimens which agree with the descriptions of both *ficus* and *citricus*, but in neither instance was it possible to separate them clearly. Specimens of the same population furnished, at times, intermediate forms linking the species to one another.

A few years ago the present writer carried out a study of the identity of *Planococcus citri* to ascertain whether there was any ground for the taxonomic separation of the populations living on the roots of coffee, which at times are responsible for the death of young trees. Detailed observations led to the conclusion that two races are involved in East Africa. There is one race—in *sensu lato* typical—in which the circulus is large, strongly constricted in the middle and foldable. As a rule it thrives on the aerial parts of the host, though occasionally it may be found on the roots. In the other race the circulus is variable in size, at times very small, roundish or transversely elongate and mostly unfoldable ; furthermore, the antennae and legs tend to be shorter and the dermal structures fewer in number. This race attacks only the roots of the host plant, thus displaying a very close ecological and morphological affinity with *Planococcus citricus* Ezzat & McConnell. The specimens from roots are often associated with a fungus. Further research may well warrant the recognition of a true ecological subspecies. Specimens living on roots of coffee were submitted to Prof. S. W. Brown of the Department of Genetics, University of California, Berkeley (U.S.A.) ; and to Prof. P. Buchner of Porto d' Ischia, Naples (Italy), for examination of the chromosome pattern and symbiotic micro-organisms respectively ; but in neither instance were differences found from the common citrus mealy bug. In slide smears of the mycetoma, stained with Heidenhain's iron haematoxylin, the writer often observed large numbers of rod-like bacteria, but was unable to ascertain whether their presence had a pathogenic or merely symbiotic significance.

CONGO : Kivu, 15.ii.1958, on *Coffea arabica* L. (*D. J. McCrae*).

KENYA : Nairobi, 1.xii.1950, on *Gardenia* sp., 7.v.1951 on *Chenopodium pumilo* R. Br. (*M. S. Mattrass*), 3.iii.1937, on *Aberia caffra* Hook. f. & Harv. (*A. R. Melville*), 26.iv.1951 on *Solanum muricatum* Ait., 24.ix.1948, on *Vernonia* sp. (*R. H. Le Pelley*), 5.xii.1951, on *Spartium junceum* L., 8.iv.1952, on *Solanum tuberosum* L., 27.x.1953, on *Acacia* sp., 7.i.1957, on *Pterolobium exosum* E. G. Baker (*G. De Lotto*) ; Donyo Sapuk, 12.iv.1937, on *Combretum* sp. (*A. R. Melville*) ; Kibarani, 3.viii.1942, on *Gossypium* sp. (cotton) (*R. H. Le Pelley*) ; Kiambu, 5.v.1938, on *Psychotria nairobensis* Brem. (*R. H. Le Pelley*) ; Meru, 21.viii.1938, on *Coffea arabica* L. (*R. H. Le Pelley*) ; Kakamega, 16.ix.1940, on *Coffea robusta* Lindl. (*R. H. Le Pelley*) ; Voi, 22.ix.1951, on *Coffea arabica* L. (*A. A. Talbott*) ; Ruiru, 10.xii.1950, on roots of *Coffea arabica* L., 27.vii.1950, on *Cassia didymobotrya* Fres. (*D. J. McCrae*) ; Kisumu, 9.vi.1955, on *Persea gratissima* Gaertn. f. (*T. J. Crowe*) ; Machakos, 17.iv.1956, on *Citrus aurantium* L. (*R. H. Le Pelley*).[10]

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[10] First and only record of the species from citrus in East Africa.

MOZAMBIQUE : Vila Gondola, 1.iii.1962, on *Eugenia jambolana* Lam. (*D. P. Annecke*).

NYASALAND : Misuku, v.1930, on *Coffea* sp. (*C. Smee*).

SOUTH AFRICA : Pretoria, 9.vi.1955, on *Poinsettia* sp. (*E. C. G. Bedford*) ; Mossel Bay, iv.1930, on *Coffea* sp. (*C. J. Joubert*).

TANGANYIKA : Moshi, 28.x.1937, on *Coffea arabica* L. (*A. R. Melville*) ; Maramba, 30.x.1958, on *Theobroma cacao* L. (*G. Swain*) ; Nronga, 28.ix.1960, on roots of *Coffea arabica* L. (*R. G. Tapley*) ; Arusha, 25.i.1961, on *Cordia* sp., *Croton* sp., *Annona* sp., *Canna* sp. and *Ficus* sp. (*G. De Lotto*).

UGANDA : Tororo, 16.iii.1951, on *Coffea arabica* L. (*D. J. McCrae*) ; Kampala, 4.iv.1952, on roots of *Coffea robusta* Lindl. (*T. E. Taylor*) ; North Bugishu, 27.ii.1957, on roots of *Solanum indicum* L. (*D. N. McNutt*).

ZANZIBAR : 13.ii.1956, on *Theobroma cacao* L. (*R. H. Le Pelley*).

Two specimens of the race infesting the roots will be deposited in the collection of the British Museum (Natural History), London, (coll. No. 2278) ; and two in the U.S. National Collection, Washington, D.C. (coll. No. 1239).

Planococcus crassus De Lotto, 1961

Planococcus crassus De Lotto, 1961 : 219.

TANGANYIKA : Arusha, 25.i.1961, on *Rauwolfia caffra* Sond., *Croton* sp. and *Ficus* sp. (*G. De Lotto*).

***Planococcus epulus* sp. n.**

(Plate 21)

Mounted holotype specimen elongate, with anal lobe well developed ; length 1·6 mm. Margin of the body with a complete series of eighteen pairs of cerarii. Anal lobe cerarii each with two conical spines beset by a loose group of about 20 trilocular pores and four auxiliary setae ; area about the cerarian spines not chitinized. Remaining cerarii each built up with two conical spines surrounded by 5–8 trilocular pores ; auxiliary setae lacking. Ventral side of each anal lobe with an elongate chitinized bar ; apical seta robust, 255µ long ; subapical one 65µ. Multilocular disc pores arranged in transverse rows on the ventral side of the last six abdominal segments as follows : (ix plus x) 34 ; (viii) 58 ; (vii) 44 ; (vi) 42 ; (v) 12 ; (iv) 25. A few more multilocular disc pores are scattered on the ventral prosoma and on the dorsum. Tubular ducts of oral collar type very numerous on either side of the body, all attaining the same size. On the ventral and dorsal side of the abdomen and partly on the dorsal side of the thorax the ducts are arranged in transverse segmental rows. Trilocular pores slightly more numerous on the dorsum. Simple circular pores having a granulate surface, poorly marked, few and sparse. Anterior and posterior dorsal ostioles well developed with lips slightly chitinized. Circulus large. Dorsal and ventral body setae not numerous, rather robust. Legs all well developed ; hind tibiae with a few minute translucent pores near the distal end ; dimensions of legs (iii) : trochanter plus femur 307µ ; tibia plus tarsus 358µ. Anal ring with six setae 117µ long. Beak 131µ. Antennae with eight segments measuring together 482µ.

Holotype. Adult ♀. KENYA : Nairobi, 7.i.1957, on *Pterolobium lacerans* R. Br. (*G. De Lotto*). Coll. No. 2695.

The specimen was found among a population of the common *Planococcus citri* (Risso).

Planococcus flagellatus De Lotto, 1961

Planococcus flagellatus De Lotto, 1961 : 220.

UGANDA : Sebei, 2.iii.1957, on roots of *Cassia petersiana* Bolle (*D. N. McNutt*).

Planococcus kenyae (Le Pelley, 1935)

Pseudococcus lilacinus Cockerell ; Kirkpatrick, 1927 : 15 [misidentification].
Pseudococcus lilacinus Cockerell ; James, 1932 : 2 [misidentification].
Pseudococcus lilacinus Cockerell ; James, 1933 : 429 [misidentification].
Pseudococcus kenyae Le Pelley, 1935 : 185.
Pseudococcus kenyaensis Betrem, 1936 : 129.
Pseudococcus kenyae Le Pelley ; Betrem, 1937 : 62.
Planococcus kenyae (Le Pelley) Ezzat & McConnell, 1956 : 83.

KENYA : Karatina, 15.vii.1936 on *Gossypium* sp. (cotton) (*H. Wilkinson*) ; Kiambu, 3.iv.1953, on roots of *Coccinia* sp. (*A. R. Melville*) ; Nairobi, 5.i.1951, on *Ficus verrucocarpa* Warb., 6.i.1951 on roots of *Phaseolus* sp., 7.i.1951 on *Jacaranda mimosaefolia* D. Don., 26.ii.1951, on *Bauhinia purpurea* L., 3.iii.1951, on *Beta vulgaris* L., 19.ii.1951, on *Lolium perenne* L. and *Sonchus oleraceus* L., 3.viii.1951, on *Annona squamosa* L., 24.viii.1951, on *Carissa edulis* Vahl, 19.x.1951, on *Cassia didymobotrya* Fres. (*G. De Lotto*), 16.iii.1951, on *Pueraria thumbergiana* Benth. (*G. M. Lavers*), 18.xii.1951, on *Solanum seaforthianum* Andr. (*F. J. Graham*), 25.ii.1951, on *Hedysarum coronarium* (*M. S. Nattrass*).

TANGANYIKA : Bukoba, 2.x.1935, on *Coffea* sp. (*F. B. Notley*).

UGANDA : Bunyoro, 13.xi.1959, on *Tristania conferta* R. Br. (*C. H. Lyadda*) ; Bwamba, 5.vi.1951, on *Coffea robusta* Lindl. (*D. J. McCrae*) ; Entebbe, 30.iii.1938, on *Coffea eugenioides* S. Moore, 16.iii.1938, on *Annona cherimola* Mill. (*A. R. Melville*) ; 19.xi.1951, on *Gardenia* sp. (*D. J. McCrae*) ; Kampala, 29.ii.1935, on *Gliciridia* sp. (*F. B. Notley*), 30.xi.1951 on *Codiaeum variegatum* Blume (*D. J. McCrae*), 28.xi.1951, on *Erythrina abyssinica* Lam. (*R. H. Le Pelley*), 22.iii.1955, on *Psidium guajava* L. and *Solanum* sp. (*T. J. Crowe*), 6.i.1955, on *Ricinus communis* L. (*M. Magala*), 10.x.1956, on *Coffea arabica* L. (*D. N. McNutt*) ; Nomyoyo, 20.ii.1959, on *Theobroma cacao* L. (*J. Brown*).

Planococcus nigritulus De Lotto, 1961

Planococcus nigritulus De Lotto, 1961 : 222.

TANGANYIKA : Mwanza, 20.x.1961, on *Ficus* sp. (*G. De Lotto*).

Planococcus rotundatus De Lotto, 1954

Planococcus rotundatus De Lotto, 1954 : 110.
Planococcus rotundatus De Lotto ; Ezzat & McConnell, 1956 : 97.

KENYA : Nairobi, 2.iii.1937, on *Coffea arabica* L. (*A. R. Melville*) ; Limuru, 15.iii.1951, on *Croton megalocarpum* Hutch. (*G. De Lotto*) ; Kisumu, 6.vi.1958, on *Acacia* sp. (*G. De Lotto*).

Planococcus subterraneus **sp. n.**

(Plate 22)

Mounted holotype specimen elliptical, with anal lobes fairly well developed ; length 2·3 mm. Margin of the body with eighteen pairs of cerarii. Anal lobe cerarii each with two finely pointed conical spines surrounded by about twenty trilocular pores and one or two slender auxiliary setae ; area about the cerarian spines not chitinized. Remaining cerarii each with two spines, except in one side of the body where the (x) and (xvii) cerarii are each reduced to one spine only ; the spines tend to be slightly longer than those of the anal lobe cerarii and at times they are somewhat lanceolate. Ventral side of each anal lobe with a well marked elongate chitinized bar ; apical seta on both lobes missing ; subapical one 95μ long. Multilocular disc pores set in transverse rows on the ventral side of the last six abdominal segments ; the number of pores occurring on each segment is as follows : (ix plus x) 71 ; (viii) 104 ; (vii) 114 ; (vi) 116 ; (v) 98 ; (iv) 32. A few pores are scattered on the thorax. No multilocular pores occur on the dorsum. Dorsal tubular ducts of oral collar type set singly on the marginal area on some of the abdominal segments, except in one side of the preanal segment in which two ducts are present. Ventral tubular ducts also of oral collar type ; all having the same diameter, but somewhat variable in length ; besides a few associated with the ventral abdominal multilocular disc pores, small groups of ducts occur on the ventral marginal area of all abdominal segments and thorax. Trilocular pores not numerous. Simple disc pores very poorly marked, few and sparse. Anterior and posterior dorsal ostioles well developed with lips slightly chitinized. Circulus rather large. Dorsal setae not numerous ; some of them are very robust, at times strongly bifurcate ; ventral ones also robust, all finely pointed. Legs well developed ; hind coxae and tibiae with some minute translucent pores ; dimensions of legs (iii) : trochanter plus femur 372μ ; tibia plus tarsus 401μ. Anal ring normal with six setae measuring 175μ in length. Beak 146μ. Antennae with eight segments measuring together 496μ.

Holotype. Adult ♀. SOUTH AFRICA : Pretoria, 15.viii.1958, on roots of *Ficus* sp. (*H. K. Munro*). Coll. No. 2389.

Planococcus subukiaensis De Lotto, 1954

Planococcus subukiaensis De Lotto, 1954 : 110.
Planococcus subukiaensis De Lotto ; Ezzat & McConnell, 1956 : 99.

This species was described as living on an unknown plant. Subsequently I have been informed by Dr. R. H. Le Pelley, former Senior Entomologist, Scott Agricultural Laboratories, Nairobi, that in fact the specimens were found on leaves of arabica coffee. The original collecting data therefore should be read as follows :

Holotype. Adult ♀. KENYA : Subukia : 8.viii.1933, on *Coffea arabica* L. (*F. B. Notley*). Coll. No. 56.

Paratypes. Five adult ♀. Same data as holotype.

PSEUDOCOCCUS Westwood, 1840

Pseudococcus Westwood, 1840 : 448.
Trechocorys Curtis, 1843 : 444.
Cocconidia Amyot, 1847 : 494.

Type species : *Coccus adonidum* Linnaeus, 1767.

As has been pointed out by Laing (1944) and Ferris (1950), the use of *Coccus adonidum* Linnaeus, 1767, as the type species of the genus *Pseudococcus* Westwood, 1840, is invalid. Despite the strong evidence against this practice, no attempt is here made to introduce any change. Hence the genera *Trechocorys* Curtis, 1843, and *Cocconidia* Amyot, 1847, having the same type species, are listed as synonyms of *Pseudococcus*.

Another genus linked by some earlier workers with *C. adonidum* is *Diaprostocetus*—at times spelt *Diaprostetus* or *Diaprostechus*—which according to them was erected by O. G. Costa (1828) in his " Prospetto di una nuova divisione metodica del genere *Coccus*."[11] Actually in this paper Costa only used the word " Diaprosteci ", which, as Fernald (1903) and Ferris (1957) pointed out, is a vernacular name with no nomenclatural status.[12]

As conceived by Ferris (1950) the genus *Pseudococcus* now represents a fairly natural group of forms. Seven species have been recorded or described so far from Africa south of the Sahara, some of which are very likely immigrants.

PROVISIONAL KEY TO SPECIES

1	Preanal cerarii (ii) enclosed within a well marked chitinized area	2
	Preanal cerarii not enclosed within a chitinized area	5
2 (1)	With more than one dorsal oral rim duct near each of most of the cerarii . .	3
	With only one dorsal oral rim duct associated with some of the marginal cerarii.	4
3 (2)	With 2 or 3 oral rim ducts of different sizes near most of the cerarii ; ventral multilocular disc pores very few about the genital opening only . .	***adonidum***
	Dorsal oral rim ducts variable in number, all attaining the same size, small ; ventral multilocular disc pores extending as far as the (v) abdominal segment	***occiduus***
4 (2)	Anal and preanal cerarii each situated in a deep depression . .	***concavocerarii***
	Anal and preanal cerarii situated as normal	***fragilis***
5 (1)	With a single fairly large oral rim duct near the frontal cerarii (xvii) ; remaining dorsal ducts associated with most of the remaining marginal cerarii of the oral collar type ; body setae long and robust	***citriculus***
	All dorsal tubular ducts associated with the marginal cerarii of the oral rim type ; body setae rather short and slender	6
6 (5)	Dorsal oral rim ducts large and set singly near each of most of the marginal cerarii	***maritimus***
	Dorsal oral rim ducts small, very few	***kikuyuensis***

Pseudococcus adonidum (Linnaeus, 1767)

Dactylopius (*Pseudococcus*) *longispinus* Targioni ; Newstead, 1911 : 165.
Pseudococcus longispinus (Targioni) ; Brain, 1912 : 177.
Pseudococcus adonidum (Linnaeus) ; Lindinger, 1913 : 67.
Pseudococcus adonidum (Linnaeus) ; Vayssière, 1913 : 429.
Dactylopius longispinus Targioni ; Newstead, 1914 : 523.
Dactylopius (*Pseudococcus*) *longispinus* Targioni ; Newstead, 1914 : 305.
Pseudococcus adonidum (Linnaeus) ; Brain, 1915 : 106.
Pseudococcus adonidum (Linnaeus) ; Brain & Kelly, 1917 : 181.

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[11] This paper was first published in "Il Pontano", a short-lived journal of sciences, letters and technology printed in Naples (Italy) from 1828. See list of references at the end of this paper.

[12] Apparently Westwood (1840 : 447) first changed "Diaprosteci" to *Diaprostocetus* in a footnote. However, he made no reference to *Coccus adonidum*, but only to two other Linnean species, *C. cacti* and *polonicus*.

Pseudococcus adonidum (Linnaeus) ; Munro & Fouché, 1936 : 91.
Pseudococcus longispinus (Targioni) ; Hall, 1937 : 127.
Pseudococcus longispinus (Targioni) ; Strickland, 1947 : 506.

Newstead (1911) first recorded *Pseudococcus adonidum* from East Africa, Tanganyika, on an unknown plant at Kissaki (or Kisaki), a small centre south of Morogoro and about 110 miles from the coast. Lindinger (1913) recorded the species again from Kissaki on *Codiaeum variegatum* and from Amani (about 30 miles from the coast) on *Manihot glaziovii*. The third record was by James (1933) from western Kenya, and was based on specimens he found on *Coffea arabica* at Cherengani, about 15 miles east of Kitale. As he pointed out he failed to breed adults for microscopic preparations and the identification merely rested on the external appearance of two living specimens. Undoubtedly the material he had at hand was not *Ps. adonidum*, because according to observations carried out so far, the Linnean species does not occur in central and western Kenya or in Uganda. The specimens collected by James very likely belonged to one of the endemic long-tailed mealy bugs such as *Ps. concavocerarii*, *kikuyuensis* or, more probably, *occiduus*, which seems to be the commonest of the three on coffee in Kenya. The presence of *Ps. adonidum* in East Africa has been verified only in the eastern and coastal districts as well as on the offshore island of Zanzibar, where it does not rank as an economic pest.

The material listed below agrees well with Ferris' (1950) diagram and description.

South Africa : Pretoria, 10.ii.1957, on *Aloe arborescens* Mill. (*H. K. Munro*), 18.i.1957, on *Phalaenopsis* sp. (*G. De Lotto*) ; Stellenbosch, 15.viii.1960, on a fern (*J. H. Giliomee*) ; Durban, 15.vi.1961, on *Stangeria paradoxa* Moore (*H. D. Brown*), 22.v.1961, on *Nerium oleander* L. (*D. P. Annecke*).

Zanzibar : 14.ii.1956, on *Nephelium lappaceum* L., 13.ii.1956, on *Theobroma cacao* L. (*R. H. Le Pelley*), 27.v.1950, on *Eugenia* sp. (*M. J. Way*).

Pseudococcus citriculus Green, 1922

Pseudococcus citriculus Green ; Williams, 1958 : 233.

The identification of the material at hand is based on the redescription of the species published by Ferris (*in :* Zimmerman, 1948). As in *Ps. adonidum* the area of distribution of this species is apparently restricted to the coastal districts and offshore islands, where it has never been recorded as a pest.

Kenya : Mombasa, 24.v.1951, on *Cocos nucifera* L. (*R. H. Le Pelley*).

Zanzibar : 13.ii.1956, on *Citrus* sp. (*R. H. Le Pelley*).

Pseudococcus concavocerarii James, 1934

Pseudococcus concavocerarii James, 1934 : 105.
Pseudococcus concavocerarii James ; Strickland, 1947 : 505.
Pseudococcus concavocerarii James ; De Lotto, 1957 : 192.

Uganda : Toro, 12.iii.1951, on *Coffea arabica* L. (*D. J. McCrae*).

Pseudococcus fragilis Brain, 1912

Pseudococcus fragilis Brain, 1912 : 186.
Pseudococcus fragilis Brain ; Brain, 1915 : 117.
Pseudococcus fragilis Brain ; Brain & Kelly, 1917 : 182.
Pseudococcus gahani Green ; Joubert, 1928 : 209.
Pseudococcus fragilis Brain ; Munro & Fouché, 1936 : 92.
Pseudococcus gahani Green ; Munro & Fouché, 1936 : 92.
Pseudococcus fragilis Brain ; Essig, 1942 : 351.
Pseudococcus gahani Green ; Williams, 1958 : 233.
Pseudococcus fragilis Brain ; De Lotto, 1958 : 96.

This mealy bug was originally described from specimens attacking *Citrus* sp. at Constantia, Cape Province, South Africa (Brain, 1912), and later recorded by Joubert (1928) as *P. gahani* from pear at Elsenburg, also in the Cape Province, on material examined by the late Prof. G. F. Ferris. Munro and Fouché (1936) listed *gahani* as living on *Citrus* sp. and *Mesembryanthemum edule* L.

The synonymy of *gahani* with *fragilis* was first published by Essig (1942), on the basis of a communication he received from Joubert, who studied the identity of the two species, and found them structurally identical (De Lotto, 1958).

The species was previously known only from the southern districts of Cape Province. The record listed below from Walvis Bay in South West Africa indicates that the insect is actually much more widely distributed.

SOUTH AFRICA : Hout Bay, 15.x.1956, on *Kalanchoë beharensis* Drake (*H. K. Munro*) ; Stellenbosch, 15.viii.1960, on *Solanum tuberosum* L. (*J. H. Giliomee*).

SOUTH WEST AFRICA : Walvis Bay, September 1954, on *Welwitschia mirabilis* Hook. f. (*J. J. C. Nel*).

Pseudococcus kikuyuensis James, 1935

Pseudococcus kikuyuensis James, 1935 : 235.
Pseudococcus kikuyuensis James ; De Lotto, 1957 : 194.

ERITREA : Asmara, 5.vii.1947, on *Ficus carica* L. (*G. De Lotto*).

KENYA : Nairobi, 10.vii.1951, on *Acacia abyssinica* Hochst., 25.v.1952 on *Ficus hochstetteri* A. Rich., 24.ii.1954, on *Aberia caffra* Hook. f. Harv., 2.ix.1951, on *Acokanthera schimperi* (D.C.) Benth., 14.ix.1954, on *Flacourtia indica* L. (*G. De Lotto*).

TANGANYIKA : Arusha, 20.x.1957, on *Psidium guajava* L. and *Coffea arabica* L. (*A. R. Melville*), 25.i.1961, on *Phyllanthus discoideus* Mill. Arg. (*G. De Lotto*).

Pseudococcus occiduus De Lotto, 1961

Pseudococcus occiduus De Lotto, 1961 : 225.

UGANDA : Mukono, 20.ii.1962, on *Theobroma cacao* L. (*J. Bowden*).

RASTROCOCCUS Ferris, 1954

Rastrococcus Ferris, 1954 : 55.

Type species : *Phenacoccus iceryoides* Green, 1908.

This genus is very likely of oriental origin. In Africa south of the Sahara it is represented by the type species only.

Rastrococcus iceryoides (Green, 1908)

Dactylopius (*Pseudococcus*) *obtusus* Newstead, 1911 : 164.
Phenacoccus obtusus (Newstead) Lindinger, 1913 : 67.
Dactylopius (*Pseudococcus*) *obtusus* Newstead ; Newstead, 1913 : 68.
Phenacoccus iceryoides Green ; Green, 1922 : 391.
Rastrococcus iceryoides (Green) ; Williams, 1958 : 233.

The material at hand agrees adequately with the redescription published by Ferris (1954). The species is so far known from Zanzibar and eastern areas of Tanganyika.

TANGANYIKA : Morogoro, 15.i.1957, on *Ceiba pentandra* Gaertn. (*R. G. Tapley*), 15.vi.1959, on *Gossypium* sp. (cotton) (*G. R. Cunningham van Someren*).

RHIZOECUS Künckel d' Herculais, 1878

Rhizoecus Künckel d'Herculais, 1878 : 163.

Type species : *Rhizoecus falcifer* Künckel d' Herculais, 1878.

The first extensive study of this and a few related genera, was made by Hambleton (1946), whose views on their characters and composition were later questioned and in part rejected by Ferris (1953).

In this paper Hambleton erected the new genus *Radicoccus* with *Rhizoecus globosus* James, 1935, as the type species, and in it he included *Rhizoecus incrassatus* James, 1935, and a few other non-African species. The characters used by him for the recognition of the genus were based on the absence of the eyes, on the rounded form of the body and on the shape and size of the ungual digitules. As regards the form of the body it should be noted that James's species were described on very old adult specimens, hence their globular appearance. The taxonomic significance of the other features does not warrant the removal of the two African species from *Rhizoecus*.

The generic concept of *Rhizoecus* adopted by Ferris is unquestionably sounder and is here accepted, except that it should be restricted to those species which have tritubular ducts. Thus amended it would include the following species described or recorded from Africa south of the Sahara : *Rhizoecus albus* James, 1935 ; *angustus* James, 1935 ; *falcifer* Künckel, 1878 (of which *africanus* Brain, 1915, is a synonym) ; *globosus* James, 1935 ; *immsi* James, 1935 ; *incrassatus* James, 1935 ; *perprocerus* De Lotto, 1961 ; and *Coccidella spelaea* Strickland, 1947. Of the remaining species originally assigned to *Rhizoecus*, *graminicola* James, 1936, has been transferred to *Ripersiella* on the ground of the presence of bitubular ducts, whilst the generic position of *geniculatus* James, 1935 (of which *mabokoensis* James, 1935, is a synonym) is at present uncertain.

PROVISIONAL KEY TO SPECIES

1	Circulus lacking	2
	With up to three circuli	3
2 (1)	Anal lobes with up to seven long setae ; antennae 5-segmented ; chitinized cephalic plate present	***falcifer***
	Anal lobes with only three long setae ; antennae 6-segmented ; chitinized cephalic plate absent	***perprocerus***
3 (2)	With one circulus only	4
	With two or three circuli	6
4 (3)	Anal lobe cerarii partly or entirely enclosed within a chitinized area	5
	Anal lobe cerarii not enclosed within a chitinized area	***angustus***
5 (4)	Multilocular disc pores lacking ; chitinized cephalic plate present	***albus***
	Multilocular disc pores occurring on either side of the body ; chitinized cephalic plate lacking	***immsi***
6 (3)	With two circuli	***incrassatus***
	With three circuli	7
7 (6)	Tubular ducts entirely absent ; either side of the abdomen with the tritubular ducts arranged in longitudinal series	***globosus***
	Tubular ducts present ; tritubular ducts entirely lacking on the abdomen	***spelaeus***

RIPERSIELLA Tinsley, 1899

Ripersiella Tinsley, *in* Cockerell, 1899 : 278.

Type species : *Ripersia rumicis* Maskell, 1892.

The redescription of the type species by Morrison & Morrison (1922) offers enough evidence to assume that this is a valid genus. *Ripersiella* differs from the closely allied genus *Rhizoecus* Künckel, 1878, mainly by the total absence in the former of the large tritubular ducts, which are replaced by small bitubular ones. Hambleton (1946) in his paper on hypogeic mealy bugs did not give any taxonomic value to this feature and based his diagnosis of *Ripersiella* on the shape and size of the ungual digitules, presence of the eyes and on the elongate form of the body. He included in it four African species, all originally described by James as *Rhizoecus*. They are : *albus*, *geniculatus*, *graminicola*, and *mabokoensis*. Of these, only *graminicola* James, 1936, is referable to *Ripersiella*, as the genus is here understood. Of the remaining species, *albus* should be retained in *Rhizoecus* on the basis of the presence of the tritubular ducts typical of that genus. The generic status of *geniculatus*, of which *mabokoensis* is a synonym, is at present obscure. In this species the bi- or tritubular ducts are replaced by minute unitubular ones.

SACCHARICOCCUS Ferris, 1950

Saccharicoccus Ferris, 1950 : 216.

Type species : *Dactylopius sacchari* Cockerell, 1895.

This genus was established by Ferris in his revision of the North American species previously described or assigned to *Trionymus* Berg, 1899. Up to present it includes the type species only.

Saccharicoccus sacchari (Cockerell, 1895)

Pseudococcus sacchari (Cockerell) ; Brain, 1915 : 127.
Pseudococcus sacchari (Cockerell) ; Brain & Kelly, 1917 : 182.
Pseudococcus sacchari (Cockerell) ; Kirkpatrick, 1927 : 20.
Pseudococcus sacchari (Cockerell) ; Munro & Fouché, 1936 : 93.
Trionymus praegrandis James, 1936 : 200.
Trionymus sacchari (Cockerell) ; Hall, 1937 : 134.
Saccharicoccus sacchari (Cockerell) ; De Lotto, 1957 : 223.
Saccharicoccus sacchari (Cockerell) ; Williams, 1958 : 215.

In Kenya this species seems to be well established in all sugar cane growing areas.

KENYA : Mombasa, 31.viii.1951, on *Saccharum officinarum* L. (*R. H. Le Pelley*) ; Thika, 11.ix.1951, on *Saccharum officinarum* L. (*R. H. Le Pelley*) ; Kisumu, 23.iii.1954, on *Saccharum officinarum* L. (*T. J. Crowe*).

SOUTH AFRICA : Stellenbosch, 15.viii.1960, on *Saccharum officinarum* L. (*J. H. Giliomee*).

SPILOCOCCUS Ferris, 1950

Spilococcus Ferris, 1950 : 219.

Type species : *Dactylopius gutierreziae* Cockerell, 1896.

Of the six species from Africa south of the Sahara originally assigned by the present writer to the genus *Spilococcus*, only *S. commiphorae* De Lotto, 1961, displays a genuine similarity with the generic characters given by Ferris and should be retained in it.

The remaining species have been referred to other genera, as follows : *Spilococcus diversus* De Lotto, 1961, *S. kajiadoensis* De Lotto, 1961, and *S. limuricus* De Lotto, 1961, to the genus *Paracoccus* Ezzat & McConnell, 1956, on the grounds of having the dorsal oral rim ducts arranged in fairly regular longitudinal series ; *S. pusillus* De Lotto, 1961, in which the dorsal oral rim ducts are also set in longitudinal series, to *Chorizococcus* McKenzie, 1960, on the basis of having the marginal cerarii reduced to ten pairs only ; *S. perforatus* De Lotto, 1954, to the genus *Maconellicoccus* Ezzat, 1958, because, though having the marginal cerarii reduced to 4–6 pairs only, the dorsal oral rim ducts are numerous and distributed without any pattern, and the antennae are nine-segmented.

TRIDISCUS Ferris, 1950

Tridiscus Ferris, 1950 : 248.

Type species : *Trionymus distichlii* Ferris, 1918.

Originally Ferris (1950) introduced the genus *Tridiscus* for the inclusion of a single species whose main character is the presence of two supplementary circuli. Later (1953) he assigned to it two more North American species whose structural affinity with the type species is in the writer's opinion somewhat doubtful.

Besides the three species here described as new the genus should include *Ripersia littoralis* described by James in 1936 from Kenya. All have only one supplementary circulus and live on grasses. It may be open to question whether *T. setariae* is a true representative of *Tridiscus*, as in this species there are some oral rim ducts on the dorsal side of the body which are entirely lacking in the type species.

PROVISIONAL KEY TO SPECIES

1	Oral rim ducts entirely absent	2
	Oral rim ducts always present on the dorsum and occasionally on the ventral marginal area of the thorax	***setariae***
2 (1)	Multilocular disc pores and tubular ducts occurring only on the ventral side of the body	***biumbelicatus***
	Multilocular disc pores and tubular ducts present on either side of the body .	3
3 (2)	Marginal cerarii reduced to one pair only on the anal lobe segment ; cerarian spines beset with a few robust auxiliary setae	***littoralis***
	With two or three pairs of marginal cerarii on the last abdominal segments ; cerarian spines without auxiliary setae	***stenosomus***

***Tridiscus biumbelicatus* sp. n.**

(Plate 23)

Mounted specimens very broadly elliptical, with anal lobes obsolete ; length up to 2·9 mm. Cerarii confined to one pair on the anal lobe segment. Each cerarius is formed of two slender conical spines surrounded by a few trilocular pores ; auxiliary setae absent ; area about the cerarian spines not chitinized. Ventral side of each anal lobe without chitinized bar ; apical seta 131–146μ ; subapical one 51–66μ. Multilocular disc pores rather numerous on the ventral side of the last five abdominal segments.[13] A few multilocular pores extend in small irregular groups on the submarginal area as far as the thorax. No pores occur on the dorsum. Tubular ducts of the oral collar type of two sizes. Those of the larger size are set in small groups on the ventral marginal and submarginal areas of the abdomen ; a few are intermingled with the groups of multilocular disc pores on the thorax. Tubular ducts of smaller size scattered on the ventral side of the abdomen and thorax, and on the dorsal marginal area of the last four or five abdominal segments. Trilocular pores fairly numerous on either side of the body. Simple disc pores noticeably smaller than the trilocular pores, few and sparse. Anterior and posterior dorsal ostioles poorly developed with lips membranous. Circuli two, both transversely elongate, with surface not chitinized. Dorsal and ventral body setae few, very small and slender. Legs well developed, with a few small translucent pores on the hind coxae ; dimensions of legs (iii) : trochanter plus femur 197–226μ ; tibia plus tarsus 197–219μ. Anal ring entire, cellular, with six setae measuring 73–88μ. Beak 95–109μ. Antennae 7-segmented ; total length 263–306μ.

Holotype. Adult ♀. SOUTH AFRICA : Pretoria, 28.i.1957, on roots of grass (*G. De Lotto*). Coll. No. 2183.

Paratypes. Four adult ♀. Same data as holotype.

***Tridiscus setariae* sp. n.**

(Plate 24)

Body very elongate, with anal lobes poorly developed ; length up to 2·9 mm. Marginal cerarii reduced to one pair on the anal lobe segment, each of which is built up with two rather slender conical spines surrounded by 5–10 trilocular pores and devoid of auxiliary setae ; area about the cerarian spines not chitinized. Ventral side of each anal lobe without chitinized

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[13] The number of pores could not be satisfactorily counted because on the marginal and submarginal areas there was not a clear division between the segmental groups.

bar ; apical seta 109–131μ ; subapical one 29–36μ. Multilocular disc pores set in transverse rows on the ventral side of the last abdominal segments. The number of pores on the last five segments, inclusive of those which occasionally occur on the dorsal marginal area, is as follows : (ix plus x) 67–91 ; (viii) 114–155 ; (vii) 86–140 ; (vi) 61–93 ; (v) 28–37. A few multilocular pores are scattered along the marginal and submarginal areas of the prosoma as far as the head. Dorsal tubular ducts of the oral rim type, small, very variable in number and distribution ; on the last five abdominal segments anterior to the anal lobe one, the number of ducts is : (viii) 2–5 ; (vii) 1–2 ; (vi) 2–5 ; (v) 3–6 ; (iv) 2–5. Two to four ducts occur on the ventral marginal area of the thorax. Ventral tubular ducts of the oral collar type all having the same size, fairly numerous on the venter in association with the multilocular disc pores ; a few are scattered on the marginal area of the prosoma. Trilocular pores not numerous and evenly distributed on either side of the body. Simple disc pores on the ventral side of the abdomen roundish, rather variable in size, at times nearly as large as the multilocular disc pores, with surface slightly granulate ; those occurring on the ventral prosoma and on the dorsum are smaller in size and with the surface plain. Anterior and posterior dorsal ostioles rather inconspicuous with lips membranous. Circuli two, apparently unfoldable ; the posterior circulus is variable in diameter, at times reduced to a minute dot. Dorsal and ventral body setae few, short and slender. Legs short, otherwise normal ; hind legs without translucent pores ; dimensions of legs (iii) : trochanter plus femur 182–197μ ; tibia plus tarsus 182–204μ. Anal ring entire, apical, with six setae measuring 88–95μ. Beak 67–73μ. Antennae with six or seven segments ; total length 241–255μ.

Holotype. Adult ♀. KENYA : Nairobi, 15.xi.1953, on leaf sheaths of *Setaria verticillata* Beauv. (*G. De Lotto*). Coll. No. 1505.

Paratypes. Three adult ♀. Same data as holotype.

***Tridiscus stenosomus* sp. n.**

(Plate 25)

Mounted specimens very elongate, with anal lobes poorly developed ; length up to 2·8 mm. Marginal cerarii reduced to two or three pairs on the last abdominal segments. Anal lobe cerarii each formed by two robust conical spines without any grouping of trilocular pores or auxiliary setae ; area about the spines not chitinized. The penultimate and, where present, the antepenultimate cerarii are reduced to one spine only, slightly smaller in size than those of the anal lobe cerarii. Ventral side of each anal lobe without chitinized bar ; apical seta 131–139μ ; subapical one not differentiate from the remaining ventral body setae. Multilocular disc pores distributed all over the body and particularly numerous on the ventral side of the abdomen. The number of pores on the last three abdominal segments is as follows : (ix plus x) 88–105 ; (viii) 99–106 ; (vii) 59–69. Tubular ducts of the oral collar type of two sizes. The larger ones are few, set in small groups on the dorsal and ventral marginal areas of the abdominal segments ; others are associated with the multilocular disc pores on the last three abdominal segments ; on the ventral prosoma and all over the dorsum. Tubular ducts of smaller size very few and sparse on the ventral side of the abdominal segments. Trilocular pores entirely missing, except 1 to 5 on each lip of the dorsal ostioles and 3 to 7 close to each of the stigmatic openings. Simple disc pores small, few and sparse on either side of the body. Anterior and posterior dorsal ostioles inconspicuous with lips membranous. Circuli two, both rounded and set close to the distal margin of the (iii) and (iv) abdominal segments. Dorsal and ventral setae few, short and slender. Legs short, otherwise normal ; claws without denticle ; hind coxae with about a dozen of large rounded translucent pores ; dimensions of legs (iii) : trochanter plus femur 161–168μ ; tibia plus tarsus 161–175μ. Anal ring entire, cellular, with six setae measuring 131–146μ. Beak 58–66μ. Antennae with six segments ; total length 212–219μ.

Holotype. Adult ♀. Kenya : Nairobi, 16.xii.1955, on *Themeda triandra* Fork. (*G. De Lotto*). Coll. No. 1897.

Paratype. One adult ♀. Same data as holotype.

TRIONYMUS Berg, 1899

Westwoodia Signoret, 1875 : 337 [*non :* Brullè, 1846].
Signoretia Kraatz, 1888 : 176 [*non :* Stål, 1859].
Bergrothia Kraatz, 1888 : 360 [*non :* Reitter, 1884].
Bergrothiella Reitter, 1898 : 54 [*non :* Reitter, 1897].
Trionymus Berg, 1899 : 78 [*nomen novum*].
Bergrothula Strand, 1928 : 47.

Type species : *Trionymus perrisii* (Signoret, 1875).

This is one of the oldest genera of the coccoid family Pseudococcidae. Several species characterized by a reduction in the number of marginal cerarii and antennal segments have been described or referred to it in the past. The first critical study on the composition of the genus, though restricted to the forms occurring in the northern continent of America, was made by Ferris (1950 and 1953). Later McKenzie (1960) introduced some changes, the most important of which was the removal of all species provided with dorsal oral rim ducts. As a result of his action, the genus *Trionymus* is now reduced to a more natural assemblage of species, the majority of which live on grasses.

Besides the species here described as new, the genus should include *Ripersia themedae* James, 1936, from Uganda ; and *Trionymus inyazurae* Hall, 1937, from Southern Rhodesia.

Provisional Key to Species

1	Circulus lacking	2
	Circulus present	6
2 (1)	Multilocular disc pores entirely absent on the dorsal side of the body	. ***rhizophilus***
	Dorsum with some multilocular disc pores	3
3 (2)	Margin of the body with four or five pairs of cerarii on the last abdominal segments	***demertor***
	Marginal cerarii reduced to one pair only	4
4 (3)	Anal lobe cerarii enclosed within a chitinized area ; oral collar tubular ducts of three sizes ; hind coxae with a few translucent pores	***inyazurae***
	Area about the anal lobe cerarian spines not chitinized ; oral collar ducts of one or two sizes only ; translucent pores on hind legs missing	5
5 (4)	Anal lobe cerarii without auxiliary setae	***acomus***
	Anal lobe cerarii with 3 to 5 auxiliary setae	***zebedielae***
6 (1)	Margin of the body with 2 or 3 pairs of cerarii	***oblongus***
	Cerarii present on the anal lobe segment only	7
7 (6)	Multilocular disc pores on the dorsum present only on the submarginal area of the last abdominal segments ; circulus transversely elongate .	***themedae***[14]
	Multilocular disc pores on the dorsum extending as far as the head ; circulus rounded	8

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[14] In the specimen of the type series available for the redescription of the species (De Lotto, 1957), one of the anal lobe cerarii was ill-formed, being built up with four cerarian spines.

8 (7) Multilocular disc pores on the ventral and dorsal side of the prosoma set in small marginal groups ; cerarian spines slender . . . . . . ***longissimus***
Multilocular disc pores distributed all over the ventral and dorsal prosoma ; cerarian spines short and robust . . . . ***prolatus***

***Trionymus acomus* sp. n.**
(Plate 26)

Mounted holotype specimen very elongate, with anal lobes poorly developed ; length 2·7 mm. Marginal cerarii reduced to one pair only on the anal lobes. Each cerarius is built up with two small conical spines beset with 7–9 trilocular pores ; auxiliary setae absent ; area about the cerarian spines not chitinized. Ventral side of each anal lobe without chitinized bar ; apical seta 124μ ; subapical one not differentiated from the remaining ventral body setae. Multilocular disc pores fairly numerous and distributed all over the dorsum and venter. Tubular ducts of two sizes, both of oral collar type. The larger ones are very few and mostly scattered on the ventral and dorsal marginal areas. Tubular ducts of smaller size set in small groups on the ventral marginal area of the last four abdominal segments ; a few more occur on the midregion of the three abdominal segments anterior to the genital opening. Trilocular pores scarce and sparsely distributed on either side of the body. Simple disc pores apparently missing. Anterior and posterior dorsal ostioles inconspicuous with lips membranous. Circulus lacking. Dorsal and ventral body setae very few, very short and slender. Legs short, otherwise normal ; translucent pores absent ; dimensions of legs (iii) : trochanter plus femur 182μ ; tibia plus tarsus 212μ. Anal ring entire, cellular, with six setae measuring 102μ. Beak 66μ. Antennae with seven segments measuring together 248μ.

Holotype. Adult ♀. KENYA : Sagana, 15.vi.1956, on roots of *Aristida* sp. (*G. De Lotto*). Coll. No. 2036.

***Trionymus demertor* sp. n.**
(Plate 27)

Mounted specimens elongate with anal lobes poorly developed ; length up to 2·4 mm. Margin of the body with four, occasionally five, pairs of cerarii on the last abdominal segments. Anal lobe cerarii each with two conical spines surrounded by 10–15 trilocular pores and one auxiliary seta ; area about the cerarian spines not chitinized. Preanal cerarii each built up with two spines which tend to be progressively more slender anteriorly, and are beset with 3–6 trilocular pores. Ventral side of each anal lobe without chitinized bar ; apical seta 168–175μ ; subapical one not differentiate from the remaining ventral setae. Multilocular disc pores numerous and arranged in transverse rows on the ventral side of the last five or six abdominal segments ; a few pores are scattered on the dorsal side of the abdomen. Tubular ducts of oral collar type rather numerous on the ventral side of the abdomen in association with the multilocular disc pores ; a few occur on the dorsal side of the abdomen and on the ventral prosoma. Trilocular pores evenly distributed on either side of the body. Simple disc pores somewhat smaller than the trilocular pores, few and sparse. Anterior and posterior dorsal ostioles rather inconspicuous with lips membranous. Circulus absent. Dorsal and ventral body setae few, short and slender. Legs well developed ; hind coxae with a few translucent pores ; dimensions of legs (iii) : trochanter plus femur 212–255μ ; tibia plus tarsus 241–285μ. Anal ring entire, cellular, with six setae 73–102μ. Beak dimerous 109–117μ. Antennae with eight segments measuring together 328–358μ.

Holotype. Adult ♀. KENYA : Mombasa, 31.x.1957, on roots of grass (*G. De Lotto*). Coll. No. 2375.

Paratypes. Four adult ♀. Same data as holotype.

Trionymus longissimus sp. n.
(Plate 28)

Mounted specimens very elongate with anal lobes very poorly developed ; length up to 2·9 mm. Marginal cerarii confined to one single pair on the anal lobes ; each cerarius is formed of two slender conical spines beset with a loose group of 3 to 6 trilocular pores ; area about the spines not chitinized ; auxiliary setae missing. Ventral side of each anal lobe without chitinized bar ; apical seta 88–117μ ; subapical one not differentiate from the remaining ventral body setae. Multilocular disc pores numerous on the ventral side of the abdomen and extending in irregular groups along the ventral marginal area as far as the head. A few more pores occur on the dorsal marginal area and on the dorsal midregion of some abdominal segments anterior to the anal one. Tubular ducts of the oral collar type of two sizes. The larger ones are set in groups on the dorsal and ventral marginal areas of the last five abdominal segments ; a few are intermingled with the ventral marginal groupings of multilocular disc pores. The ducts of smaller size occur only on the ventral midregion of the abdomen. Trilocular pores not numerous and uniformly distributed on either side of the body. Simple disc pores rather few and scattered on the ventral side of the abdomen only. They are often irregularly rounded and variable in size ; the largest ones may attain the same diameter of the multilocular disc pores ; the surface is slightly granulate. Anterior and posterior dorsal ostioles inconspicuous with lips membranous and devoid of setae. Circulus rounded, apparently unfoldable, with surface membranous. Dorsal body setae few, minute, slender ; ventral ones somewhat longer. Legs short otherwise normal, without translucent pores ; dimensions of legs (iii) : trochanter plus femur 168–190μ ; tibia plus tarsus 175–190μ. Anal ring apical, with six setae 66–80μ long. Beak 66–80μ. Antennae short, 7-segmented ; total length 219–255μ.

Holotype. Adult ♀. KENYA : Nairobi, 16.xii.1955, on roots of *Themeda triandra* Forsk. (*G. De Lotto*). Coll. No. 1896.

Paratypes. Three adult ♀. Same data as holotype.

Trionymus oblongus sp. n.
(Plate 29)

Mounted specimens very elongate with anal lobes poorly developed ; length up to 2·2 mm. Margin of the body with two or three pairs of cerarii. Anal lobe cerarii each formed with two short, robust conical spines surrounded by six to ten trilocular pores and one, occasionally two, auxiliary setae ; area about the cerarian spines not chitinized. In one specimen one of the anal lobe cerarii was missing. Penultimate (ii) cerarii each with one or two spines similar to those of the anal lobe cerarii. Antepenultimate (iii) cerarii, where present, usually reduced to one spine only. Ventral side of each anal lobe without chitinized bar ; apical seta rather robust, 160–175μ long ; subapical one not differentiated from the surrounding ventral body setae. Multilocular disc pores arranged in transverse rows on the ventral side of the last five abdominal segments. Their number is as follows : (ix plus x) 34–41 ; (viii) 51–78 ; (vii) 55–69 ; (vi) 35–50 ; (v) 6–25. On the segments (viii) to (vi) a few pores are set near the basal margin. Other disc pores are scattered on the ventral prosoma and on the dorsal side of the abdomen. Tubular ducts with oral collar of two sizes. The largest ones slightly project from the integument of the body and superficially they look like those of the oral rim type. Small groups of these pores occur on the ventral marginal area of the abdomen ; a few are associated with the ventral abdominal rows of multilocular disc pores ; on the dorsum they tend to be arranged in irregular transverse segmental rows. Ducts of smaller size very few on the ventral side of the abdomen, mostly intermingled with the multilocular disc pores. Trilocular pores not numerous and evenly distributed on either side of the body. Simple disc pores apparently absent. Anterior dorsal ostioles not recognizable ; posterior ones very poorly developed with lips membranous and devoid of any grouping of trilocular pores or setae.

Circulus "dumbbell" shaped, except in one specimen in which it is rounded ; in either instance the surface is membranous. Dorsal setae rather few, short and slender ; ventral ones longer. Legs short otherwise normal ; hind coxae with a few translucent pores ; dimensions of legs (iii) : trochanter plus femur 212–263μ ; tibia plus tarsus 248–292μ. Anal ring entire, apical, with six setae 139–168μ long Beak 73–80μ. Antennae with seven segments measuring together 292–328μ

Holotype. Adult ♀. SOUTH AFRICA : Stellenbosch, no date, on *Cliffortia* sp. (*C. J. Joubert*). Coll. No. 2665.

Paratypes. Two adult ♀. Same data as holotype.

***Trionymus prolatus* sp. n.**

(Plate 30)

Mounted specimens very elongate with anal lobes poorly developed ; length up to 2·8 mm. Margin of the body with a single pair of cerarii on the anal lobe segment. Each cerarius is built up with two small conical spines surrounded by 8–12 trilocular pores ; area about the spines not chitinized ; auxiliary setae missing. Ventral side of each anal lobe without chitinized bar ; apical seta 102–109μ ; subapical one not differentiated from the remaining ventral body setae. Multilocular disc pores rather numerous ; some of them are arranged in irregular transverse rows on the ventral side of the last three or four abdominal segments ; other pores are scattered on the ventral prosoma and on the dorsum. Tubular ducts of the oral collar type of two sizes. The larger ones are not very numerous and set in small groups on the dorsal and ventral marginal areas as far as the head ; a few are associated with the multilocular disc pores on the ventral side of the abdomen. Ducts of smaller size very few, mostly intermingled with the ventral abdominal multilocular disc pores. Trilocular pores fairly numerous and evenly distributed on either side of the body. Simple disc pores smaller than the trilocular pores, with surface plain ; few of them occur on the dorsum and venter. Anterior and posterior dorsal ostioles inconspicuous, with lips membranous. Circulus rounded, unfoldable. Dorsal and ventral body setae few, short and slender. Legs small and slender, without translucent pores ; dimensions of legs (iii) : trochanter plus femur 175–190μ ; tibia plus tarsus 197–219μ. Anal ring entire, apical, with six setae 51–62μ long. Beak 66–77μ. Antennae 7-segmented, total length 212–241μ.

Holotype. Adult ♀. KENYA : Nairobi, 31.v.1956, on roots of *Themeda triandra* Forsk. (*G. De Lotto*). Coll. No. 2029.

Paratypes. Two adult ♀. Same data as holotype.

***Trionymus rhizophilus* sp. n.**

(Plate 31)

Mounted specimens elongate elliptical, with anal lobes poorly developed ; length up to 2·7 mm. Marginal cerarii reduced to two pairs on the anal and preanal abdominal segments. Anal lobe cerarii each with two conical spines surrounded by 10–14 trilocular pores and one, or occasionally, two auxiliary setae ; area about the cerarian spines not chitinized. The preanal cerarii are at times reduced to one spine only ; the spines are slightly smaller than those of the anal cerarii and are beset with 5 to 7 trilocular pores. Ventral side of each anal lobe without chitinized bar ; apical seta 146–161μ ; subapical one 44–58μ. Multilocular disc pores arranged in transverse rows on the ventral side of the last four or five abdominal segments, as follows : (ix plus x) 29–36 ; (viii) 31–51 ; (vii) 21–39 ; (vi) 10–20 ; (v) 0–2. No multilocular pores occur on the ventral prosoma or on the dorsum. Tubular ducts of three sizes, all of the oral collar type. The largest ones are very few and are set in groups of 1 to 4 on the dorsal marginal area of the last three abdominal segments and on the head ; the medium-sized ducts are numerous and set in groups on the dorsal marginal area of the abdominal segments. The smallest ducts are somewhat variable in size, at times being very slender ; they are distributed on the ventral marginal area of the abdomen and intermingled with the multilocular disc pores ; a few are scattered on the ventral prosoma. Trilocular pores not numerous and uniformly distributed on either side of the body. Simple disc pores smaller than the trilocular pores, few and scattered. Anterior and posterior dorsal ostioles rather inconspicuous, with lips membranous. Circulus absent. Dorsal setae few, short and slender ; ventral ones more numerous, somewhat longer. Legs well developed, without translucent pores ; dimensions of legs (iii) : trochanter plus femur 234–256μ ; tibia plus tarsus 248–285μ. Anal ring apical, cellular, with six setae 44–66μ long. Beak 88–95μ. Antennae with eight segments measuring together 292–336μ.

Holotype. Adult ♀. KENYA : Nairobi, 15.xii.1955, on roots of *Panicum maximum* Jacq. (*G. De Lotto*). Coll. No. 1902.

Paratypes. Eight adult ♀. Same data as holotype.

***Trionymus zebedielae* sp. n.**

(Plate 32)

Mounted specimens rather broadly elliptical with anal lobes very poorly developed ; length up to 2·9 mm. Marginal body cerarii reduced to one pair on the anal lobe segment. Each cerarius is formed of two conical spines beset with 25–30 trilocular pores and three to five slender auxiliary setae ; area about the cerarian spines not chitinized. Ventral side of each anal lobe without chitinized bar ; apical seta 124–139μ ; subapical one not differentiated from the remaining ventral body setae. Multilocular disc pores rather numerous all over the venter ; a few occur on the dorsal side of the abdomen. On the ventral abdominal segments anterior to the genital opening the pores tend to be arranged in irregular transverse rows near the basal margin of the segment involved. Tubular ducts of the oral collar type of two sizes, both numerous on either side of the body. Trilocular pores fairly numerous and evenly distributed. Simple disc pores noticeably smaller than the trilocular pores, not numerous and sparse. Anterior and posterior dorsal ostioles inconspicuous with lips membranous. Circulus absent. Dorsal and ventral body setae very few, short and slender. Legs rather stout, otherwise normal ; translucent pores lacking ; dimensions of legs (iii) : trochanter plus femur 204–219μ ; tibia plus tarsus 197–212μ. Anal ring entire, apical, with six setae measuring 66–80μ. Beak 109–124μ. Antennae normally with 8 segments, except in two specimens in which one of the antennae is reduced to 7 segments only ; total length 233–255μ.

Holotype. Adult ♀. SOUTH AFRICA : Zebediela, 5.ii.1957, on roots of grass (*G. De Lotto*). Coll. No. 2191.

Paratypes. Five adult ♀. Same data as holotype.

LOCATION OF TYPE SERIES

The holotype and paratype specimens of the new species dealt with in this paper have been deposited as follows :

	Type series	*B.M.**	*U.S.A.*	*S.A.*	*E.S.*	*S.A.L.*
Cataenococcus markhamiae	4	2	1	–	–	1
Cryptoripersia corpulenta	1	1	–	–	–	–
Eastia jouberti	7	2	1	–	4	–
Lenania prisca	2	1	–	–	1	–
Londiania obesa	2	1	1	–	–	–
Nairobia bifrons	16	10	4	–	–	2

	Type series	*B.M.**	*U.S.A.*	*S.A.*	*E.S.*	*S.A.L.*
Paracoccus busiaensis	3	2	1	–	–	–
mutabilis	5	2	1	–	2	–
pinguis	3	2	1	–	–	–
tectus	3	2	1	–	–	–
trichinus	5	3	1	–	–	1
Paraputo barbatus	3	2	1	–	–	–
Peliococcus orophilus	8	5	2	–	–	1
Phenacoccus cotyledonis	5	2	1	1	–	1
distinctus	1	1	–	–	–	–
orcinus	5	2	1	–	2	–
pauculus	2	1	1	–	–	–
Planococcus aemulor	10	5	3	–	–	2
epulus	1	1	–	–	–	–
subterraneus	1	1	–	–	–	–
Tridiscus biumbelicatus	5	2	1	1	–	1
setariae	4	2	1	–	–	1
stenosomus	2	1	1	–	–	–
Trionymus acomus	1	1	–	–	–	–
demertor	5	3	1	–	–	1
longissimus	4	2	1	–	–	1
oblongus	3	1	1	–	1	–
prolatus	3	2	1	–	–	–
rhizophilus	9	5	3	–	–	1
zebedielae	6	3	1	1	–	1

*B.M. = British Museum (Natural History), London. Inclusive of the holotype.
U.S.A. = U.S. National Collection, Washington, D.C.
S.A. = South African National Collection of Insects, Pretoria.
E.S. = Elsenburg-Stellenbosch Agricultural College, Stellenbosch, South Africa.
S.A.L. = Scott Agricultural Laboratories, Nairobi, Kenya.

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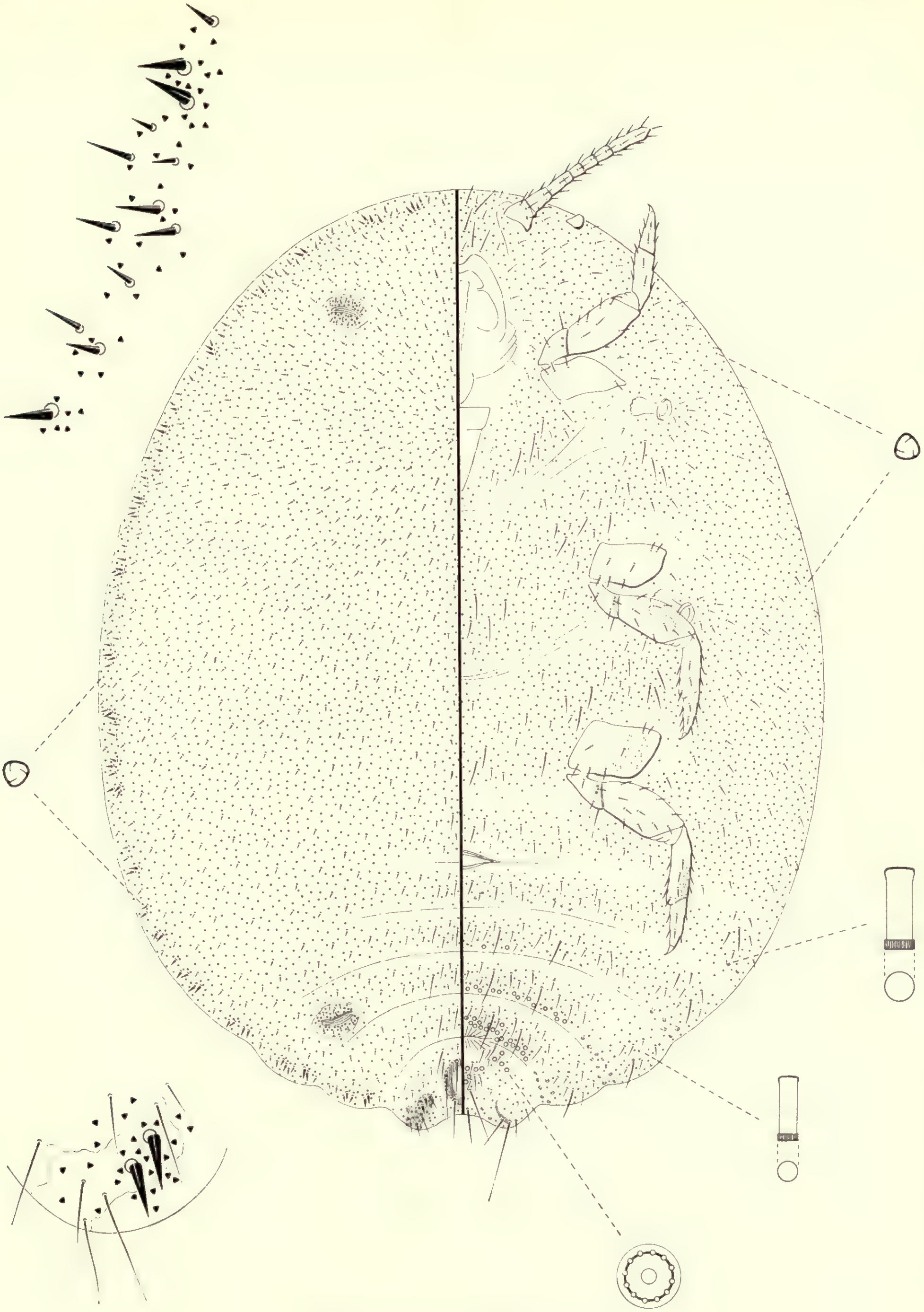

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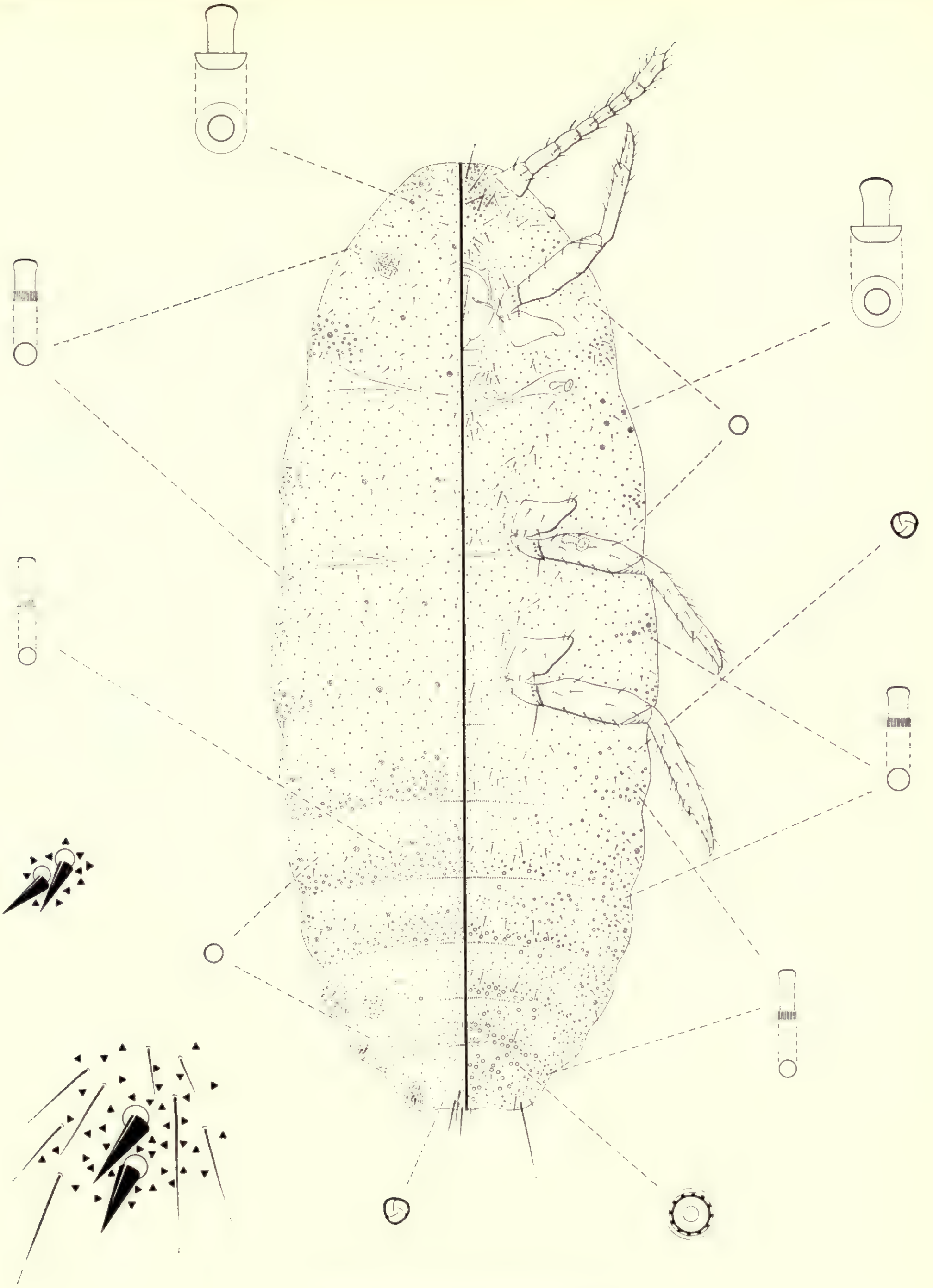

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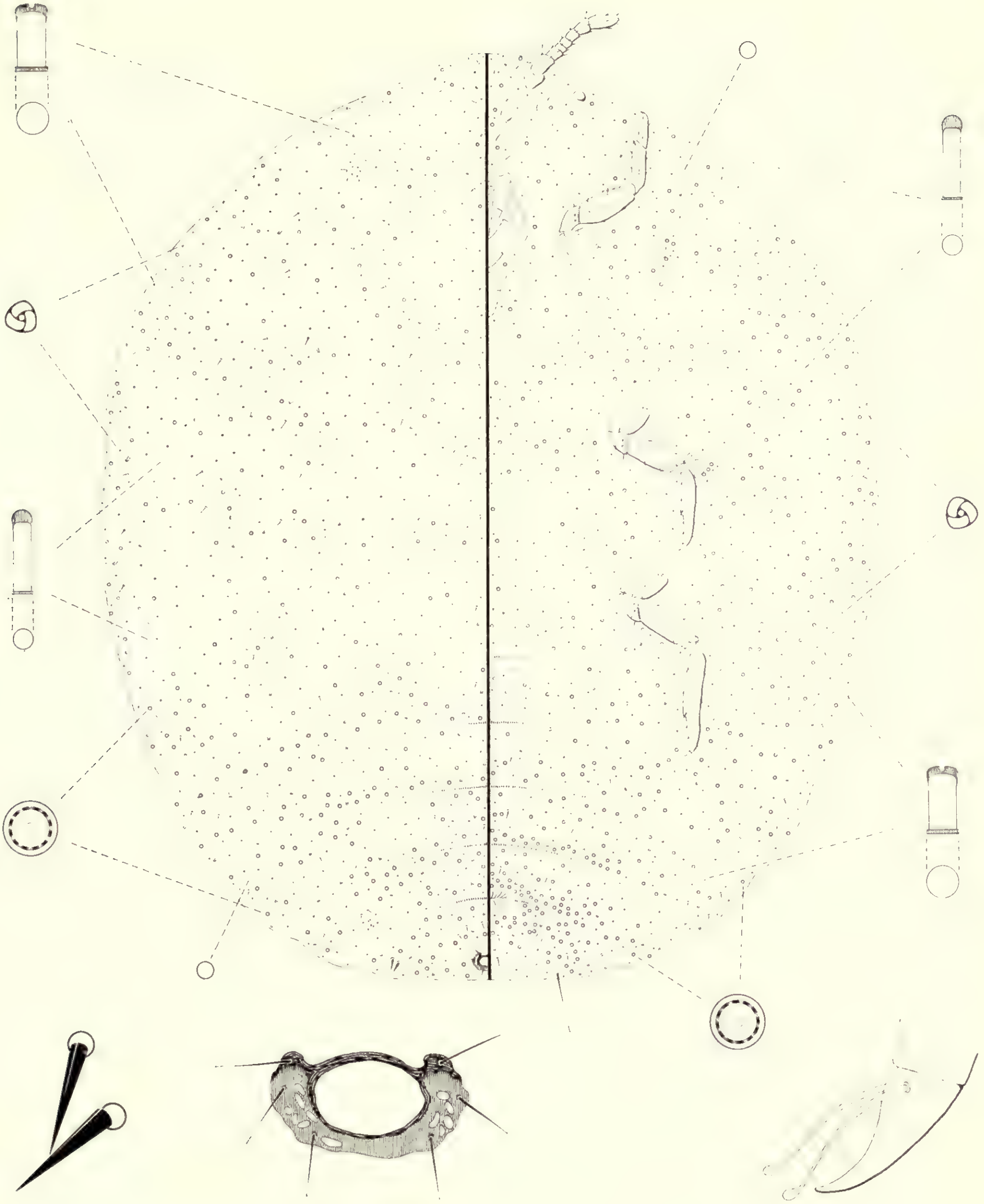
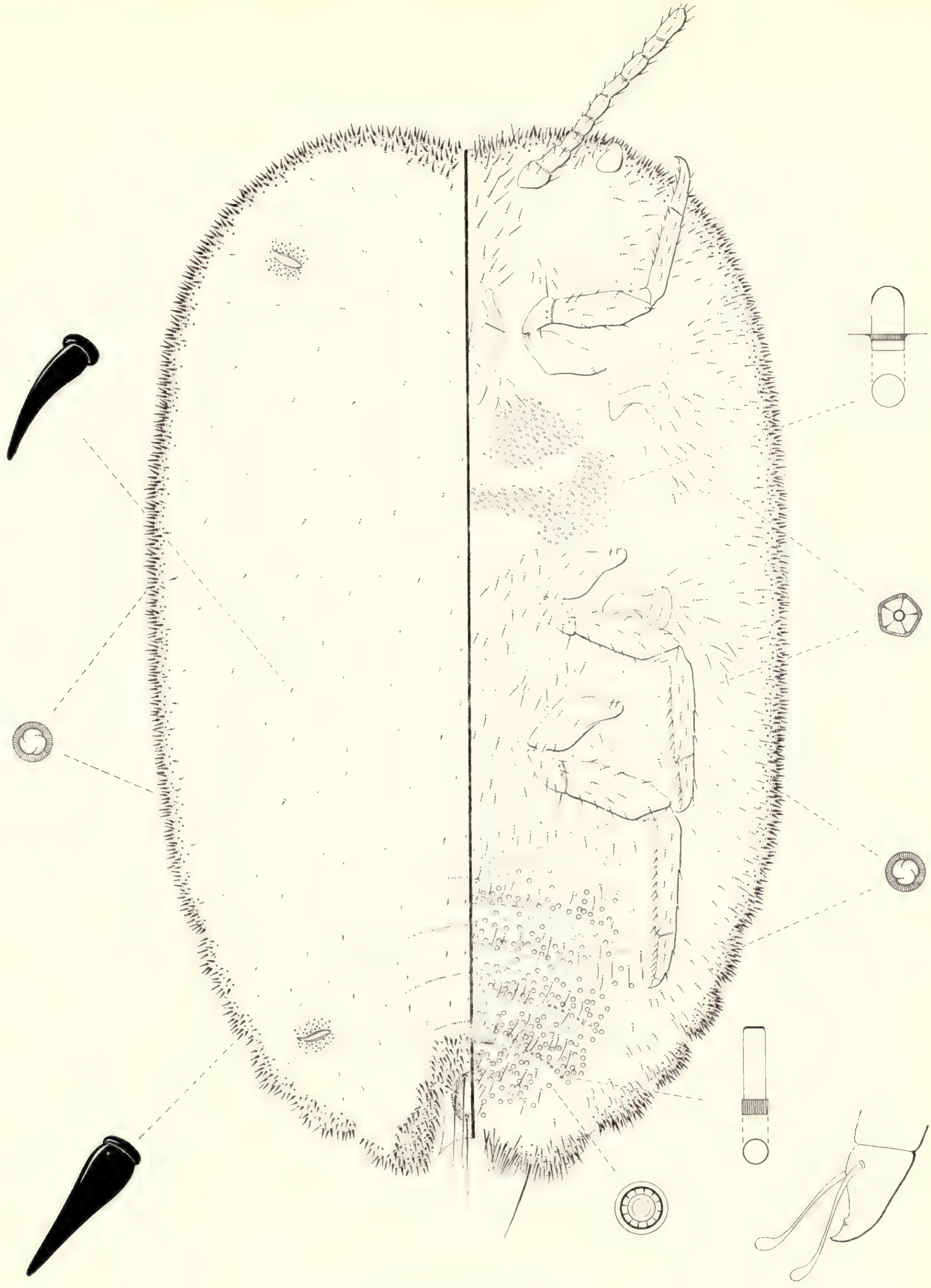
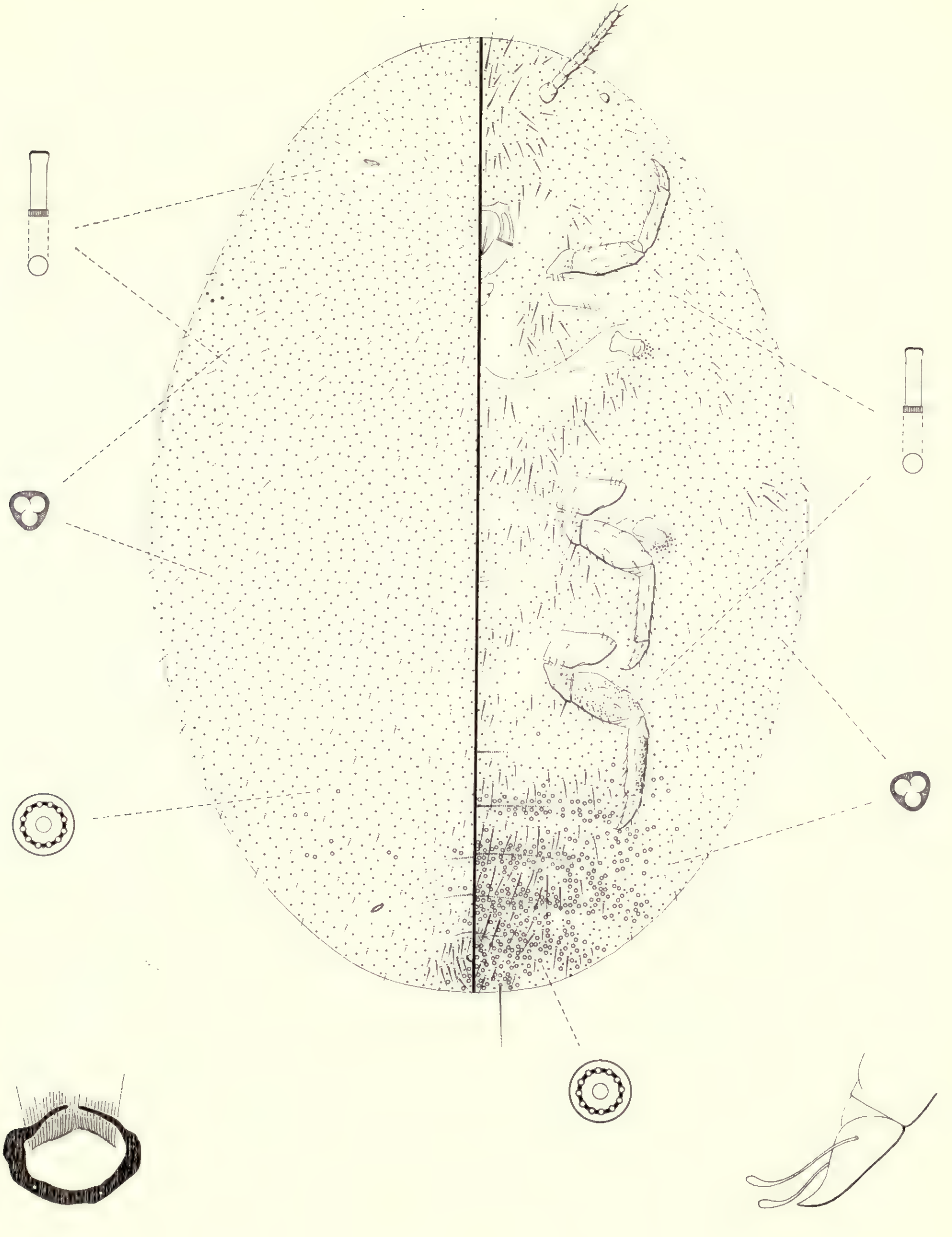


Cryptoripersia corpulenta sp. n.



Eastia jouberti sp. n.



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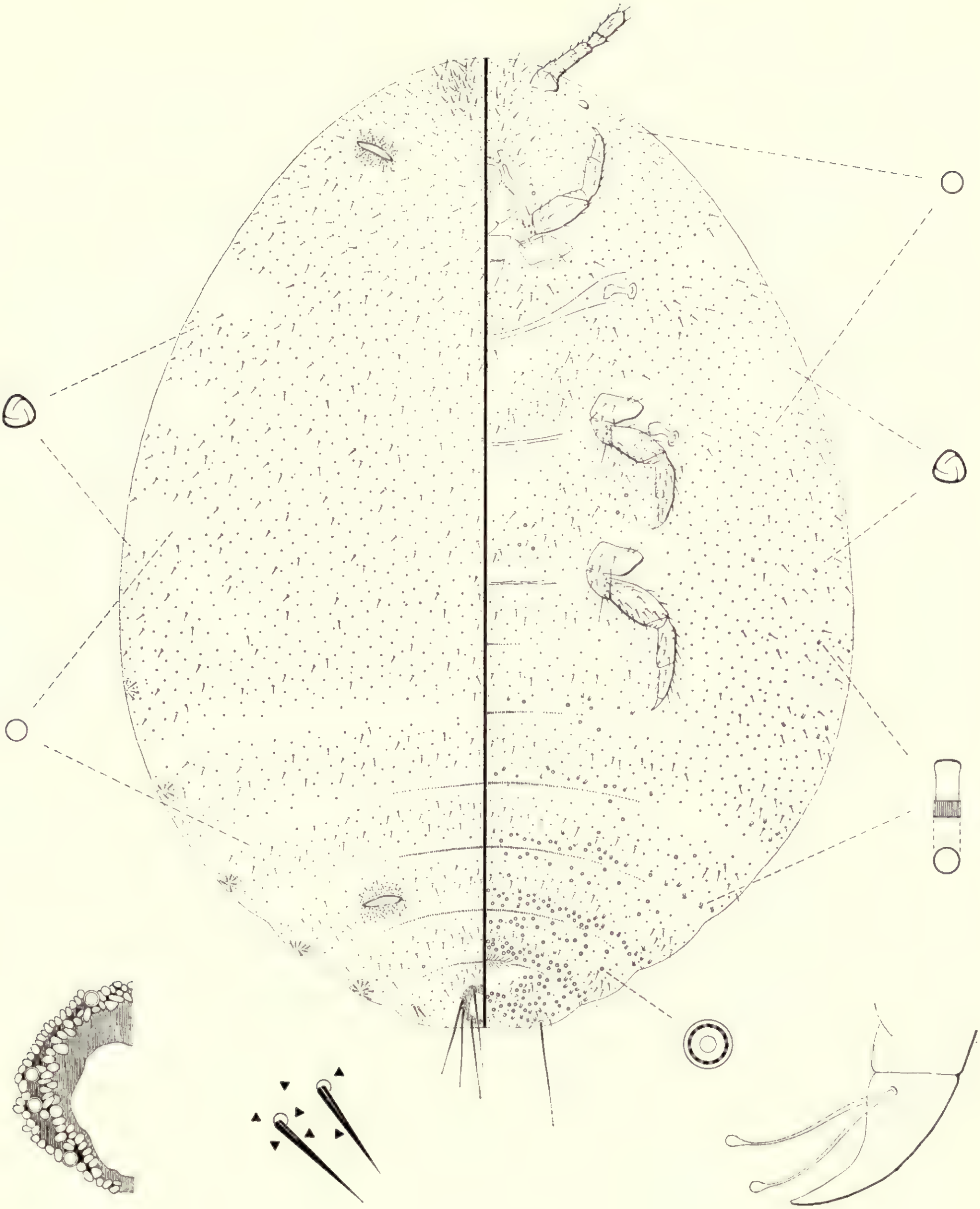

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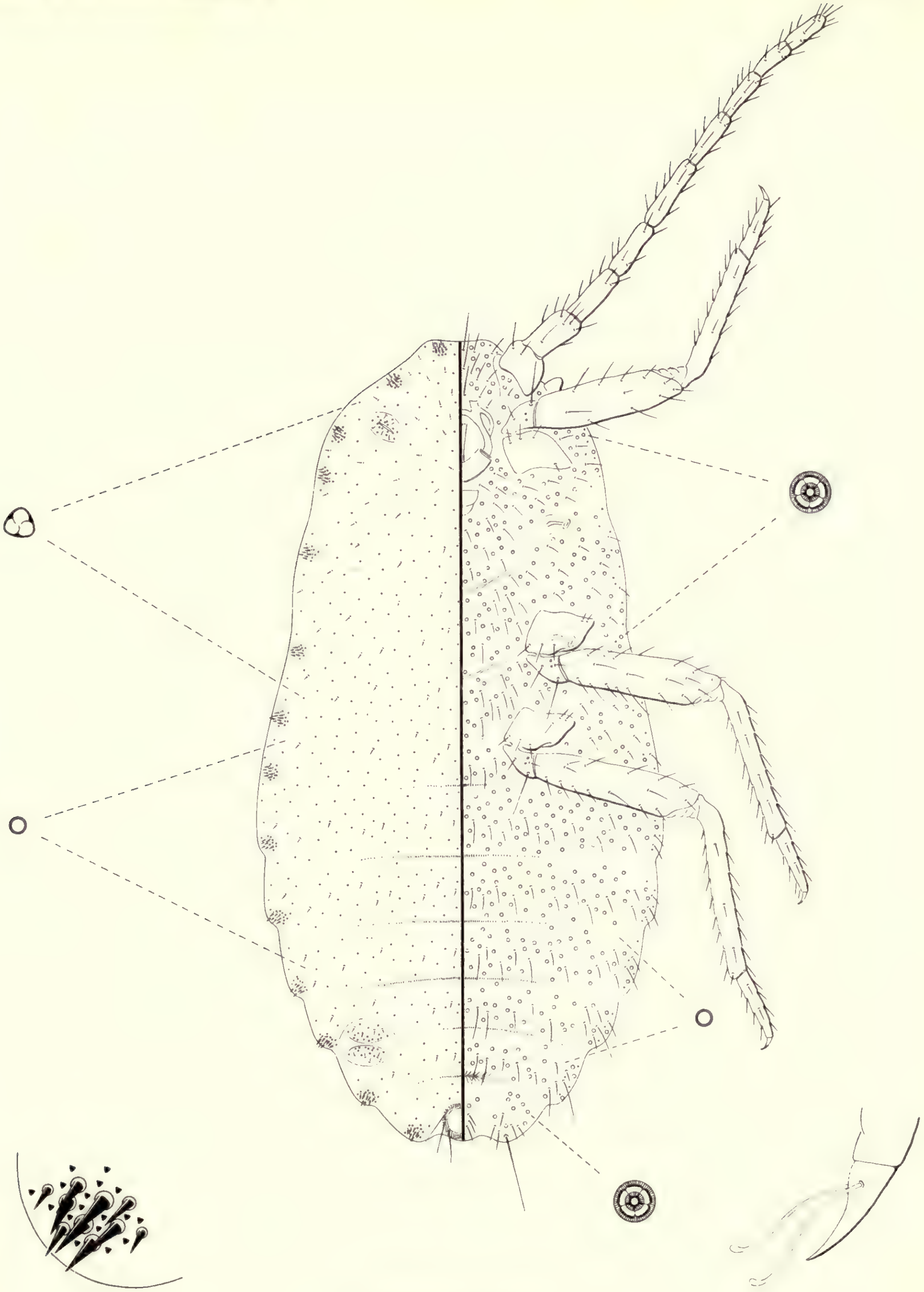

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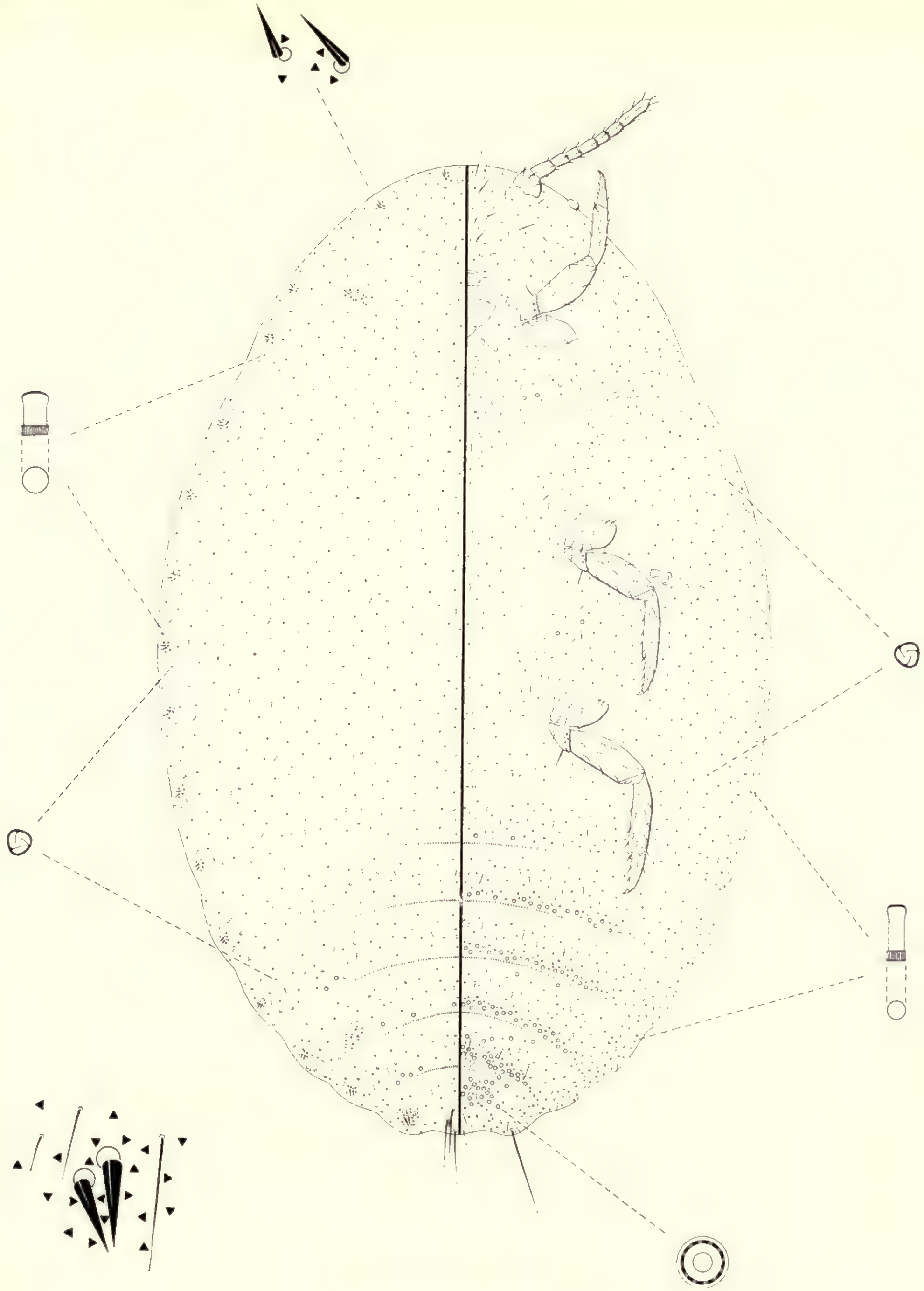

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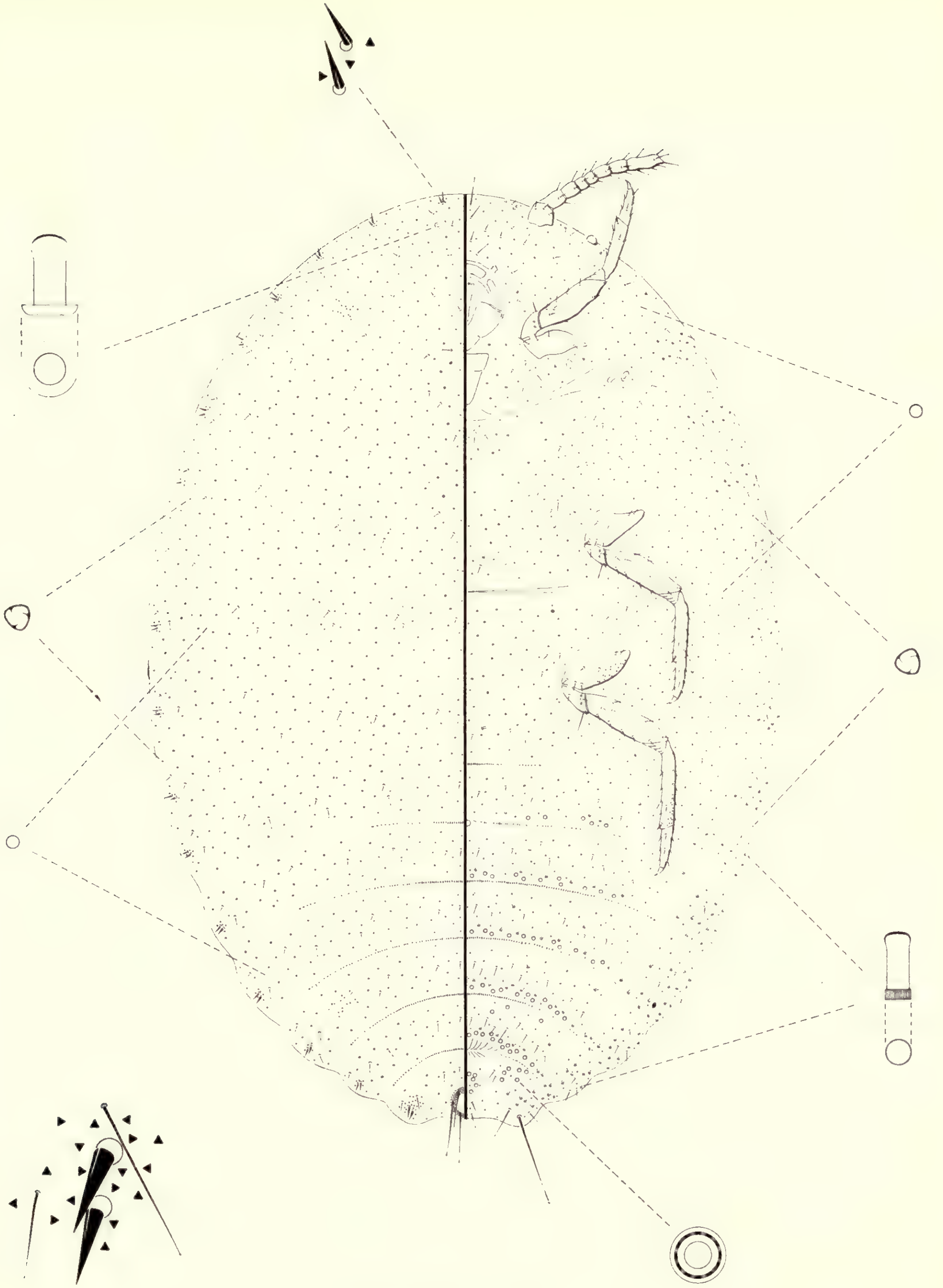

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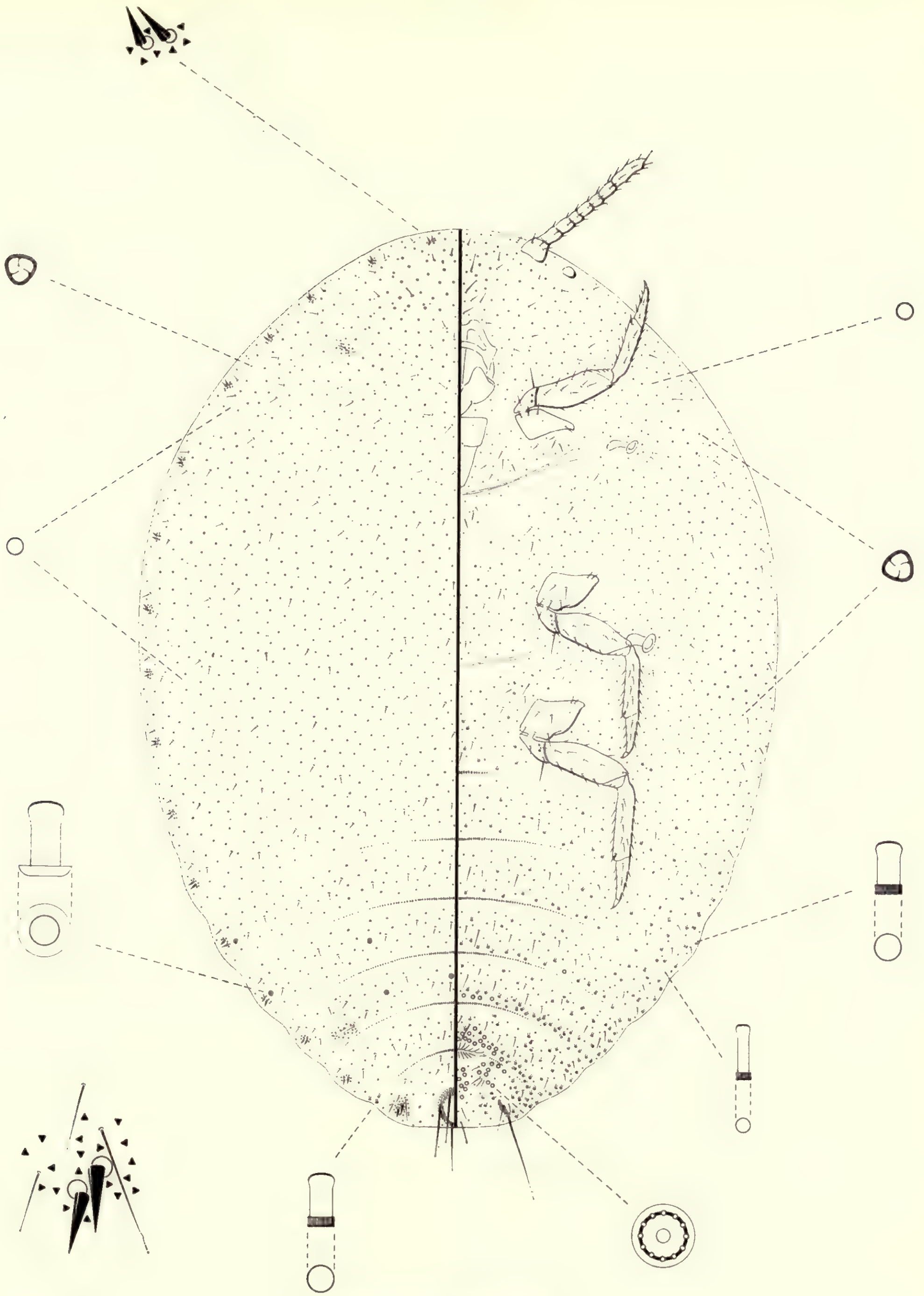

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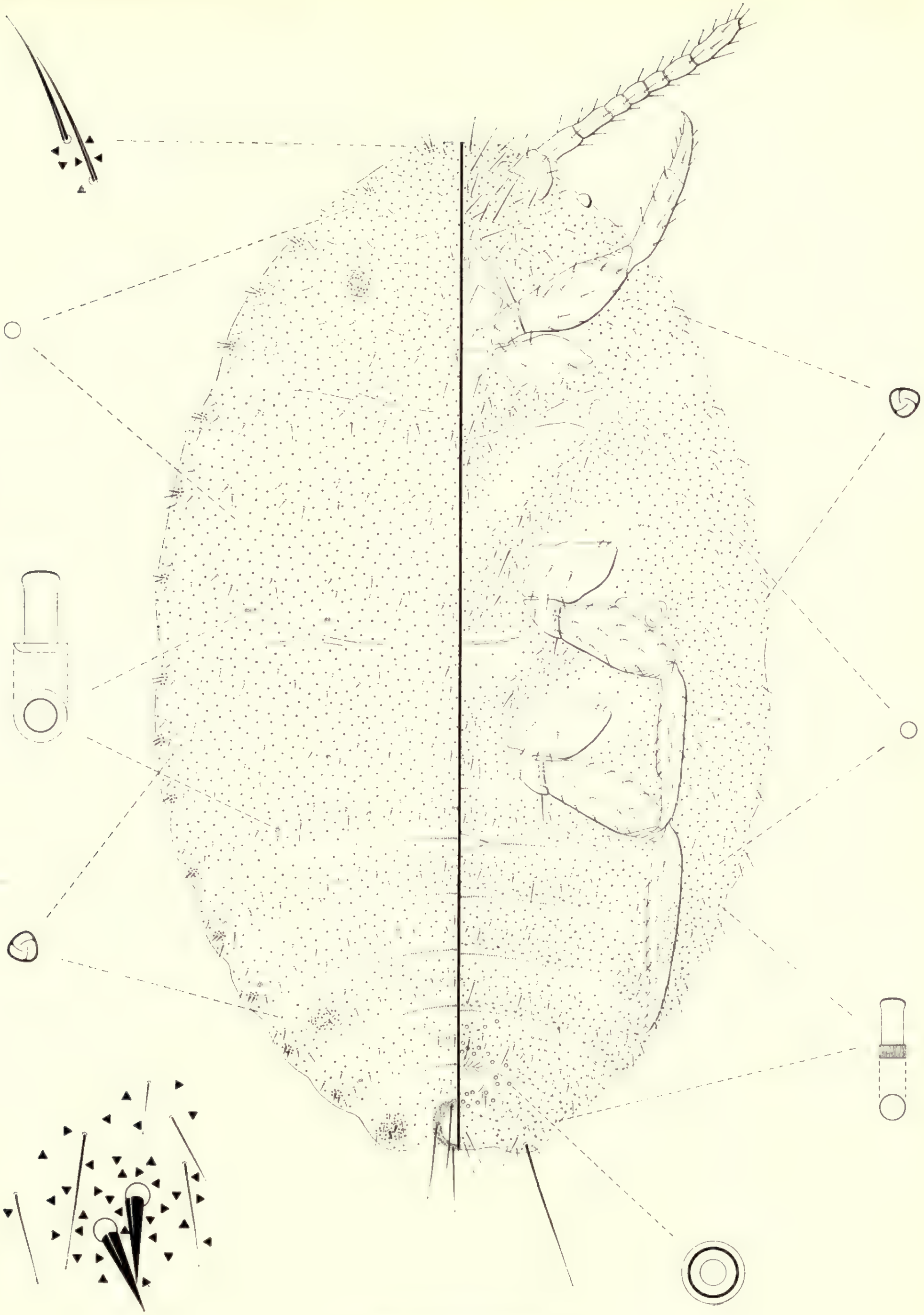

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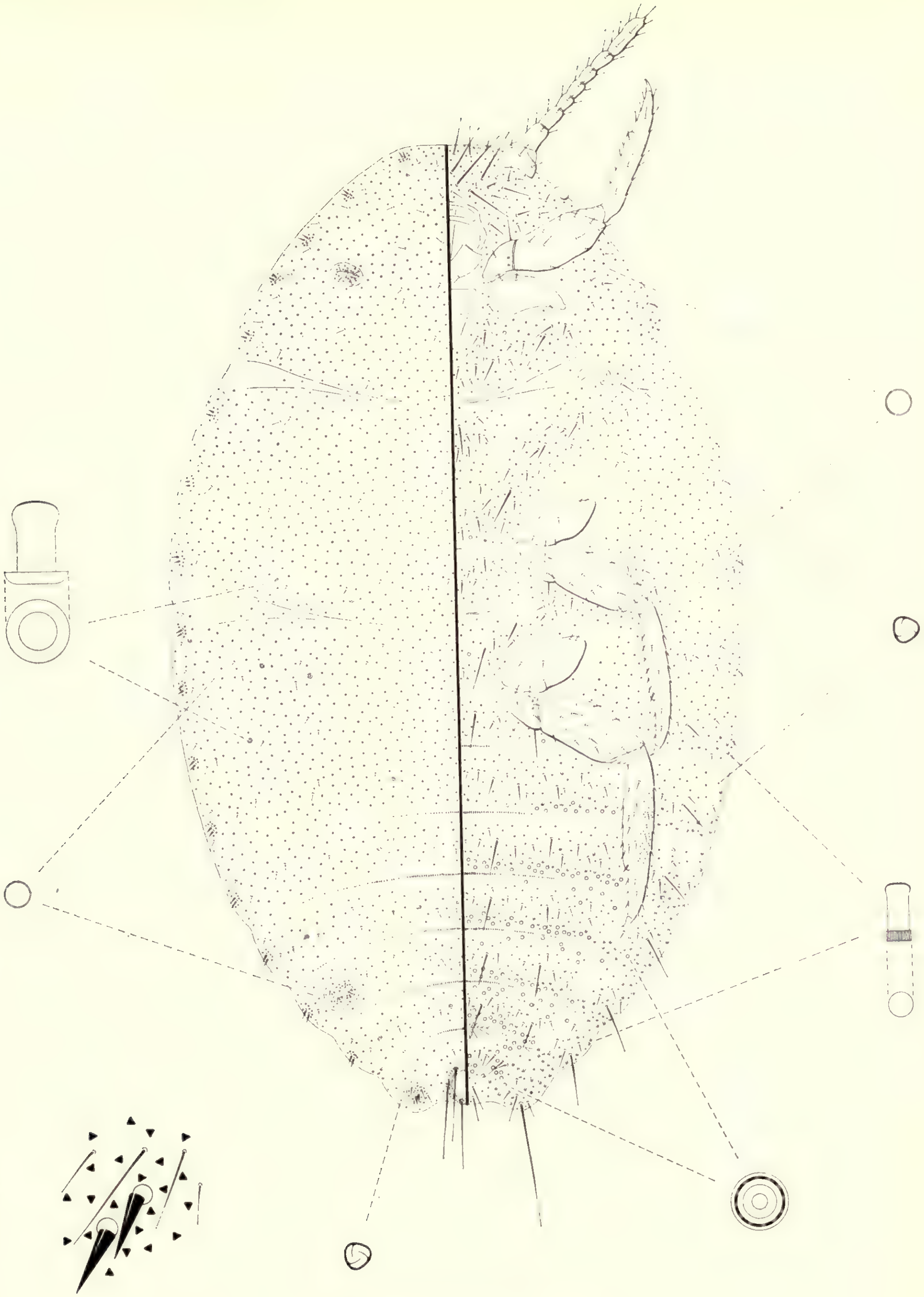

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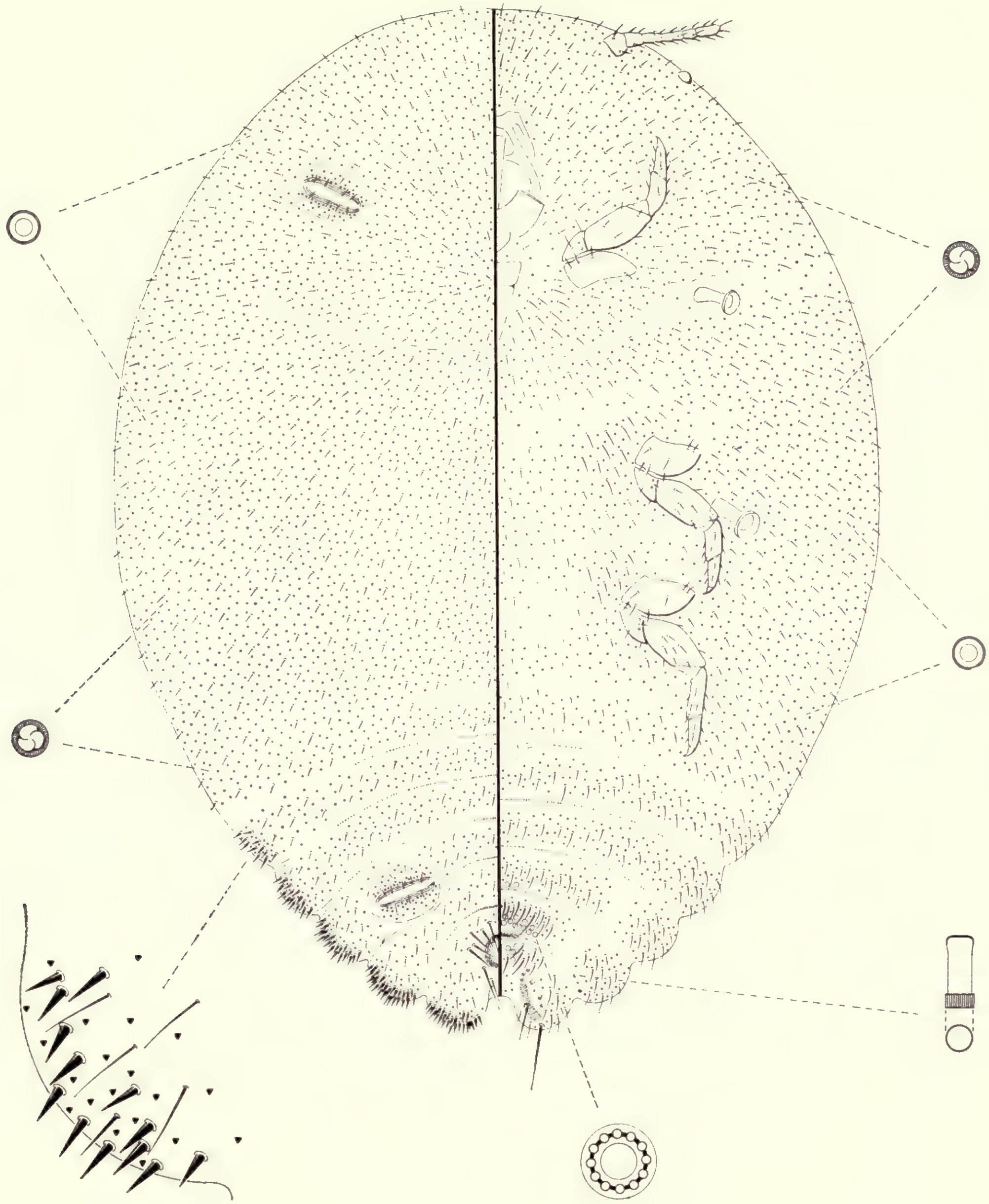

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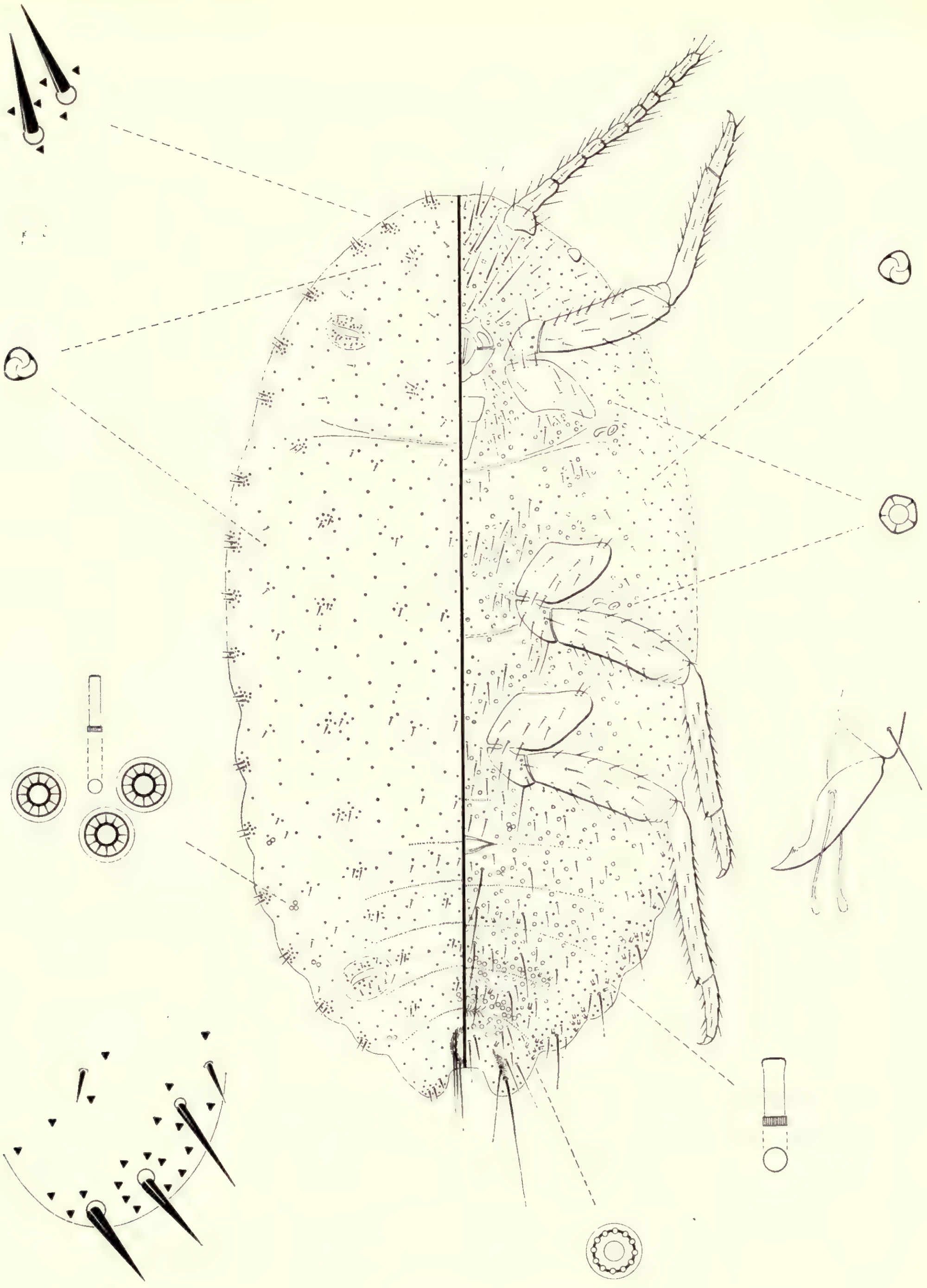

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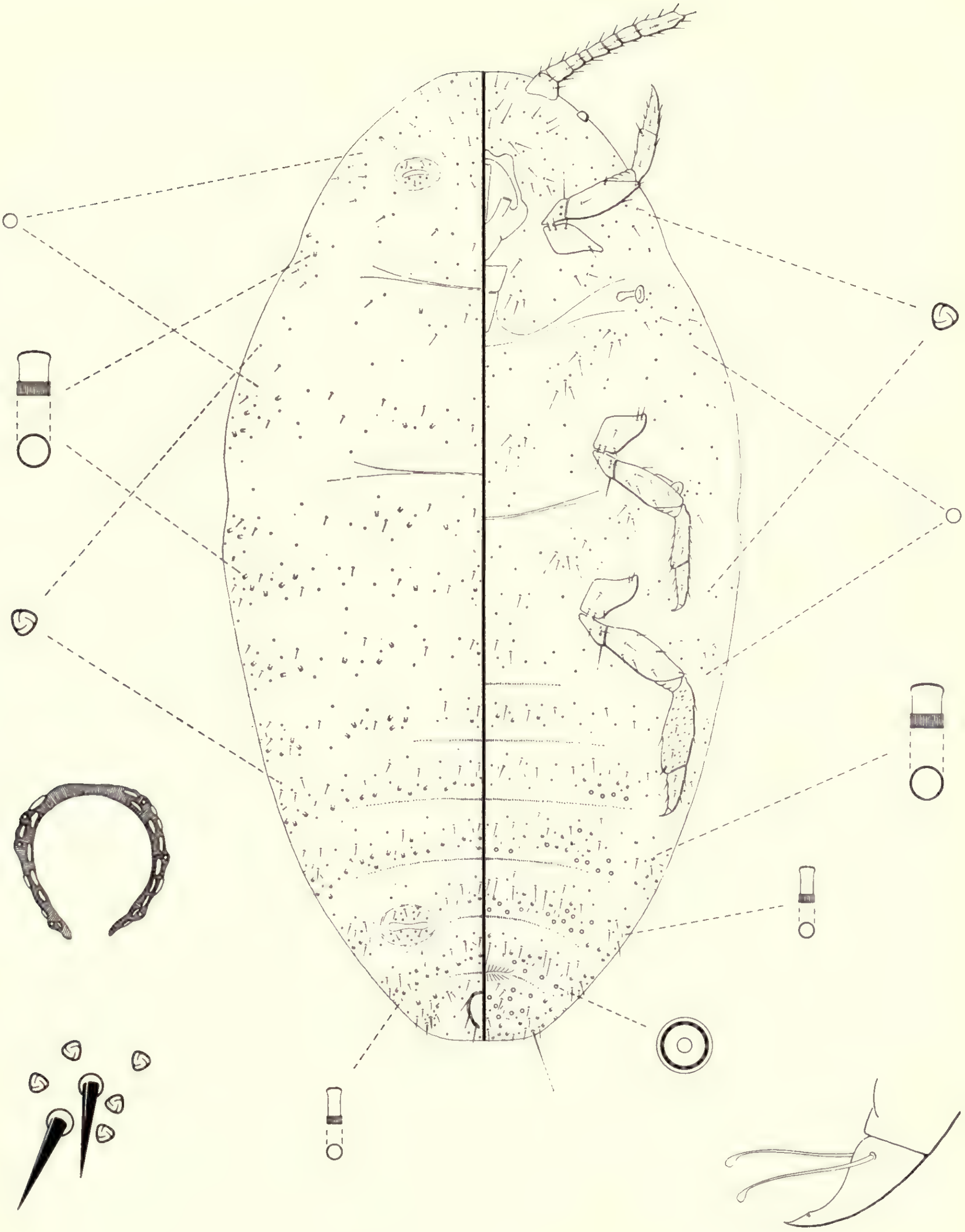

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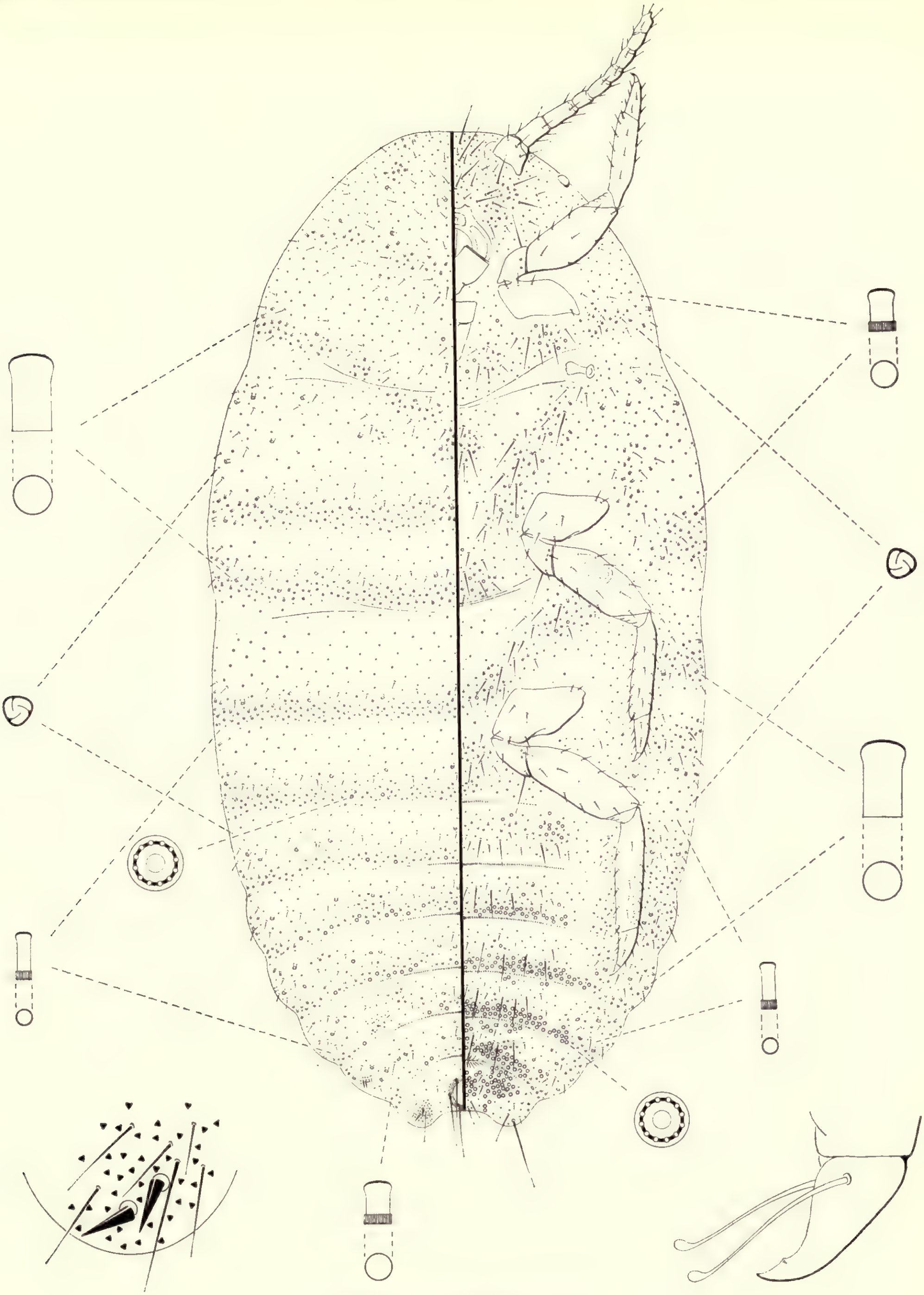

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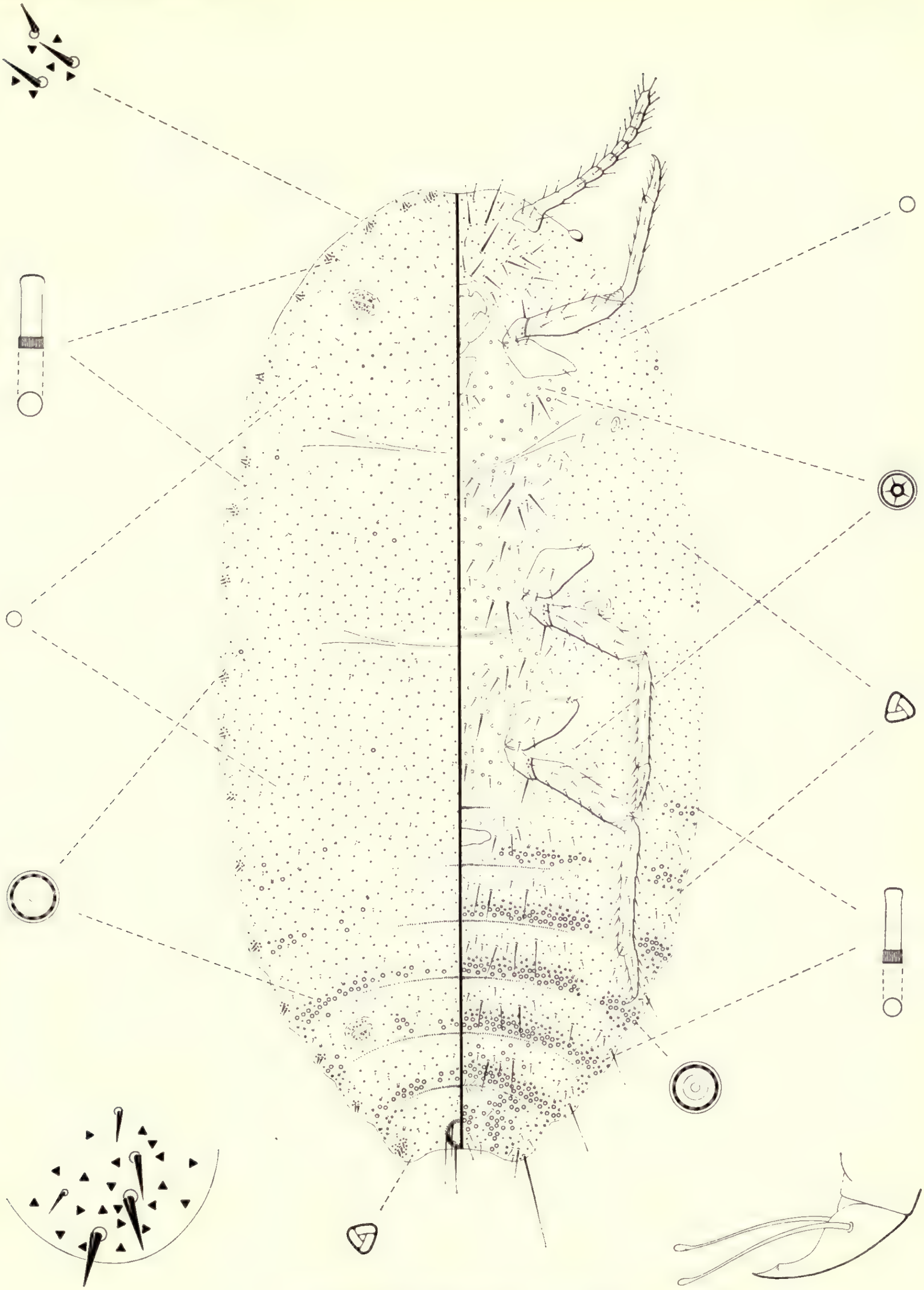
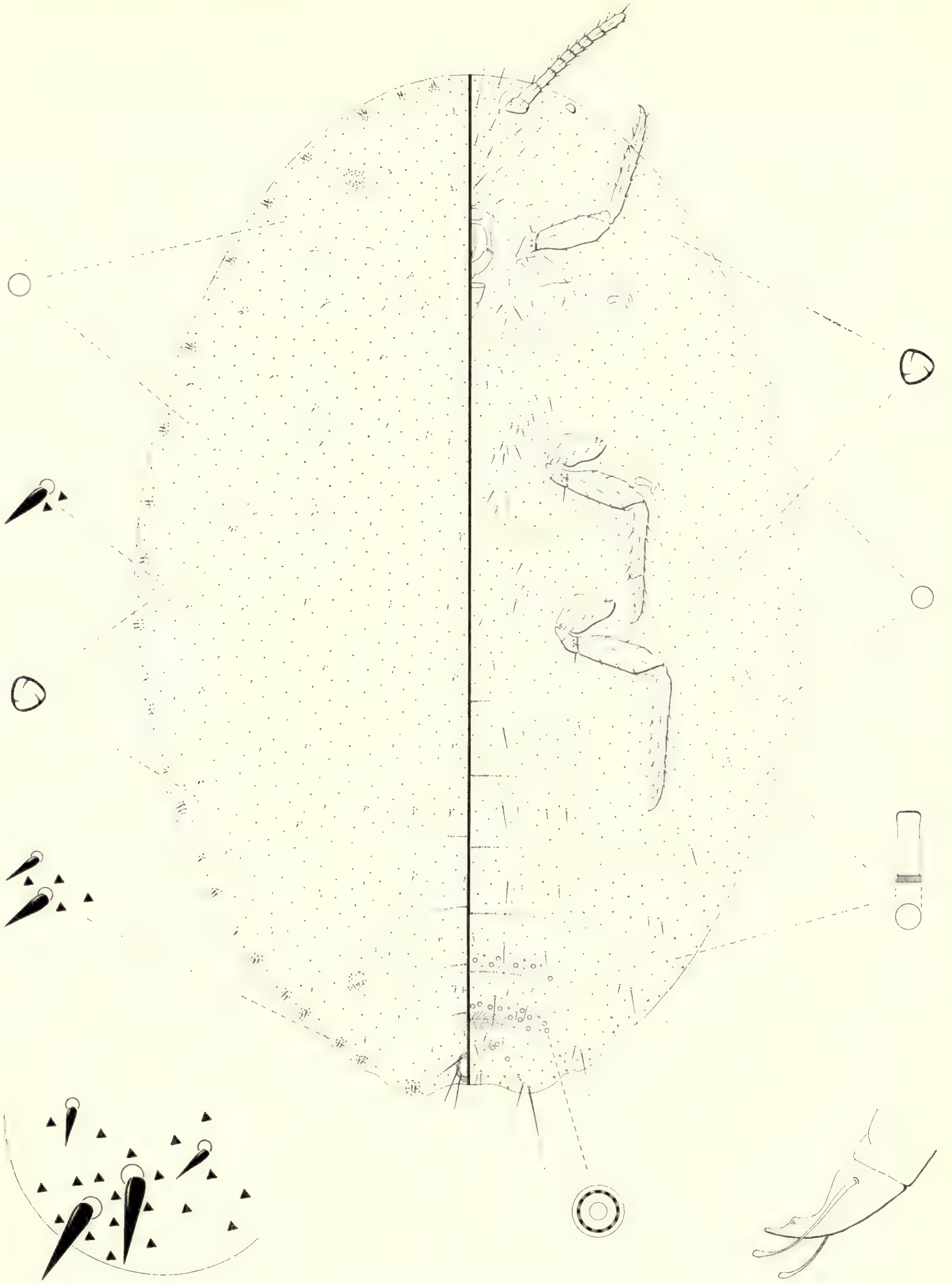


Phenacoccus graminosus McKenzie



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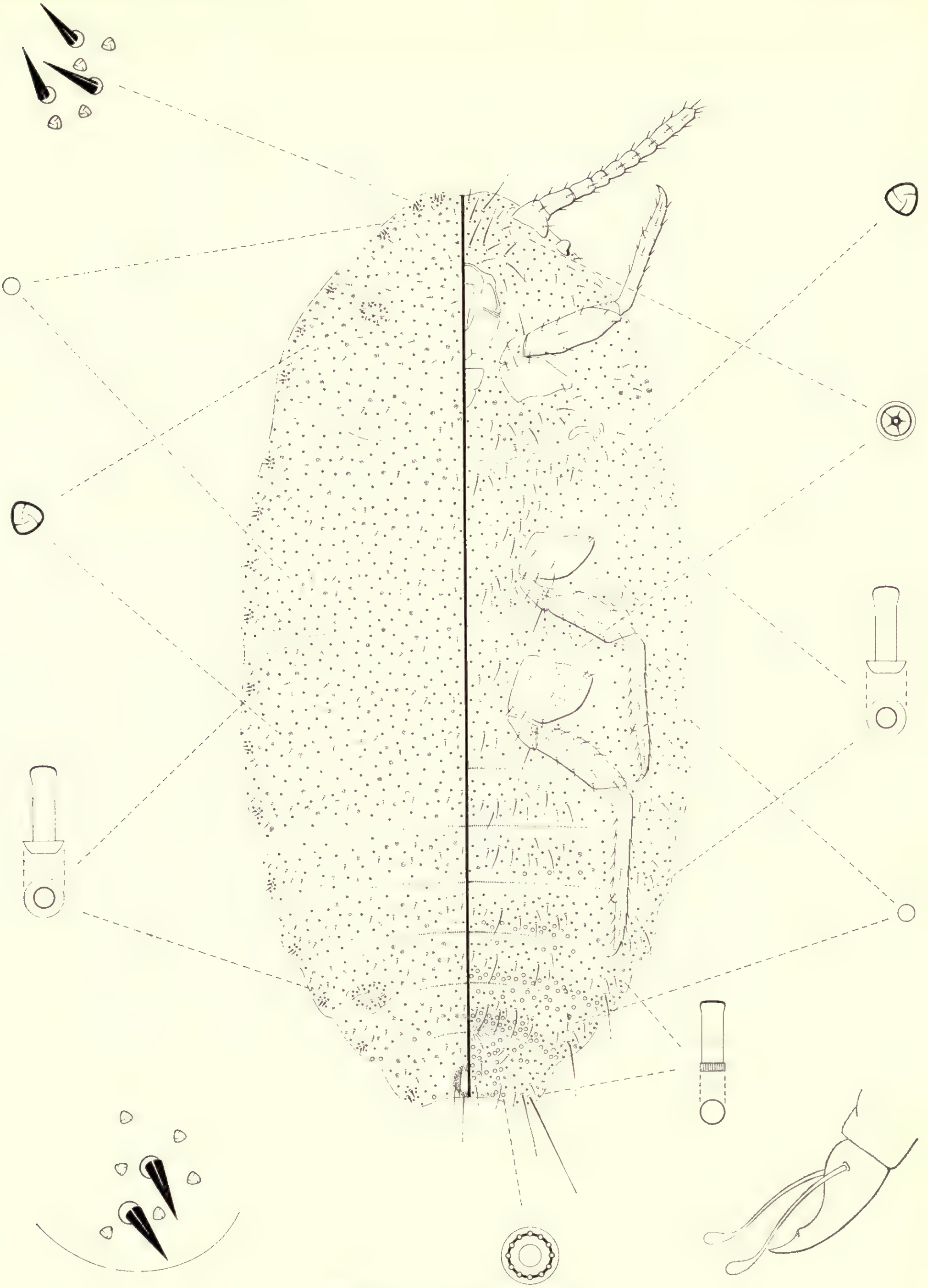

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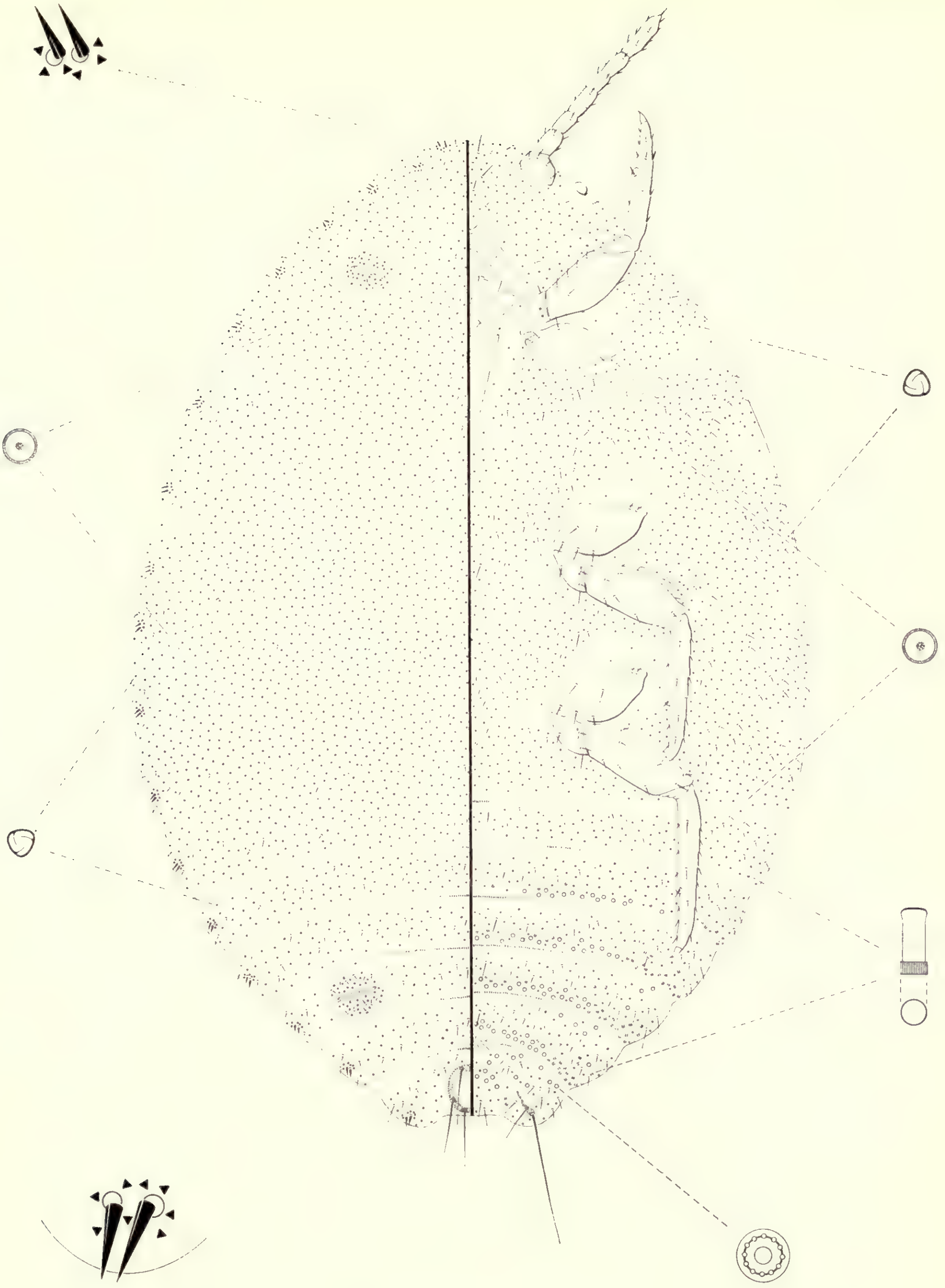
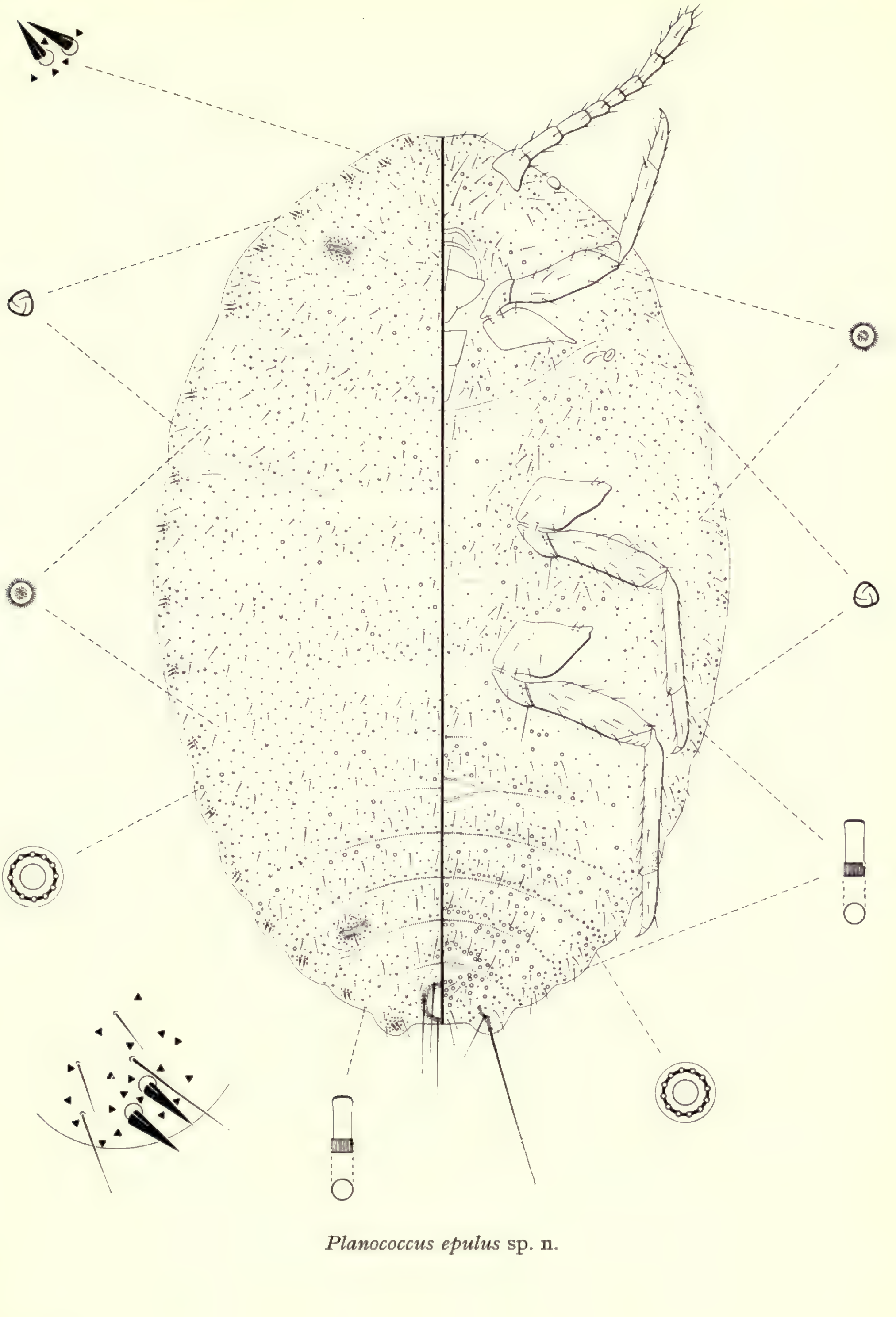


Planococcus aemulor sp. n.



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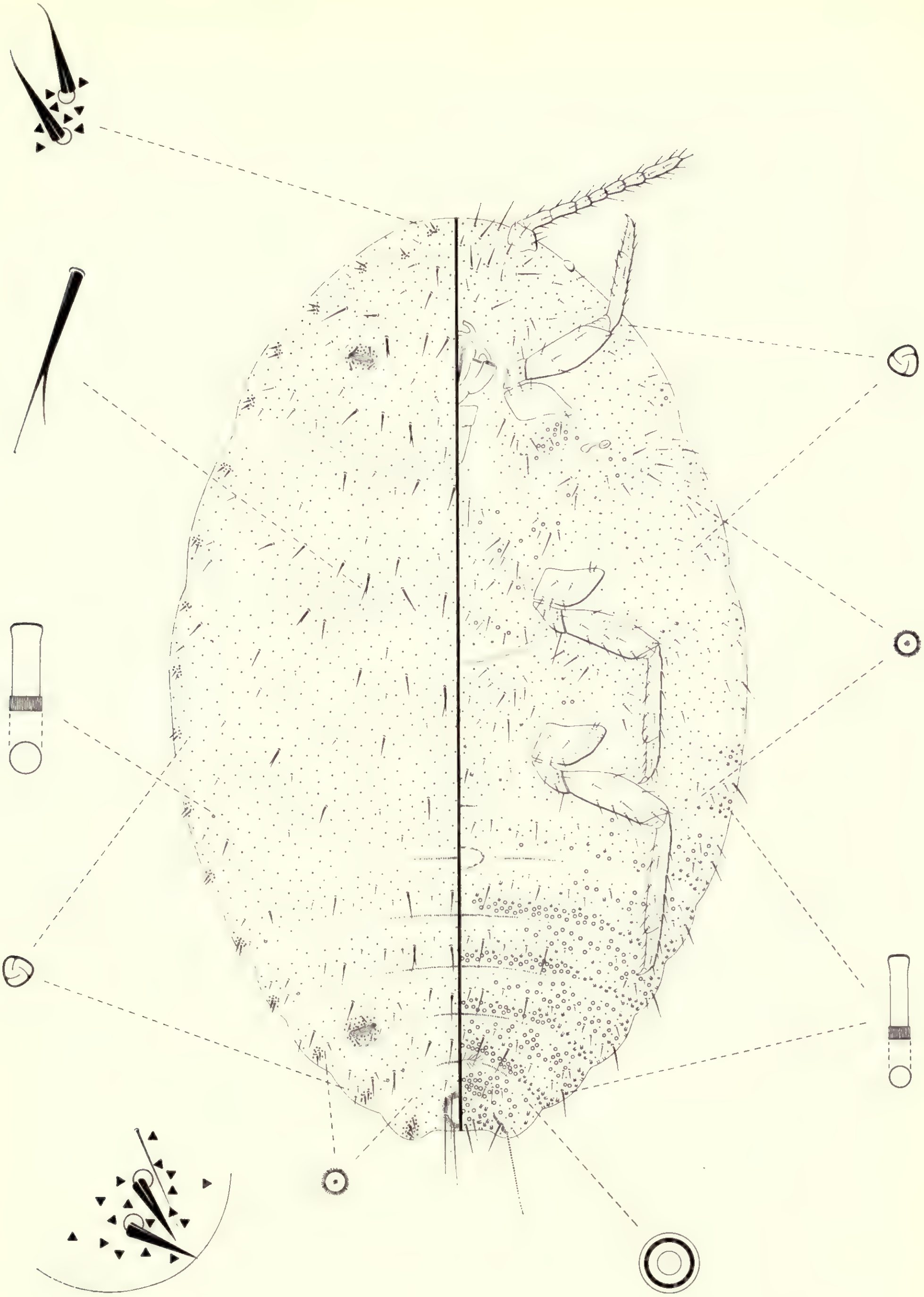

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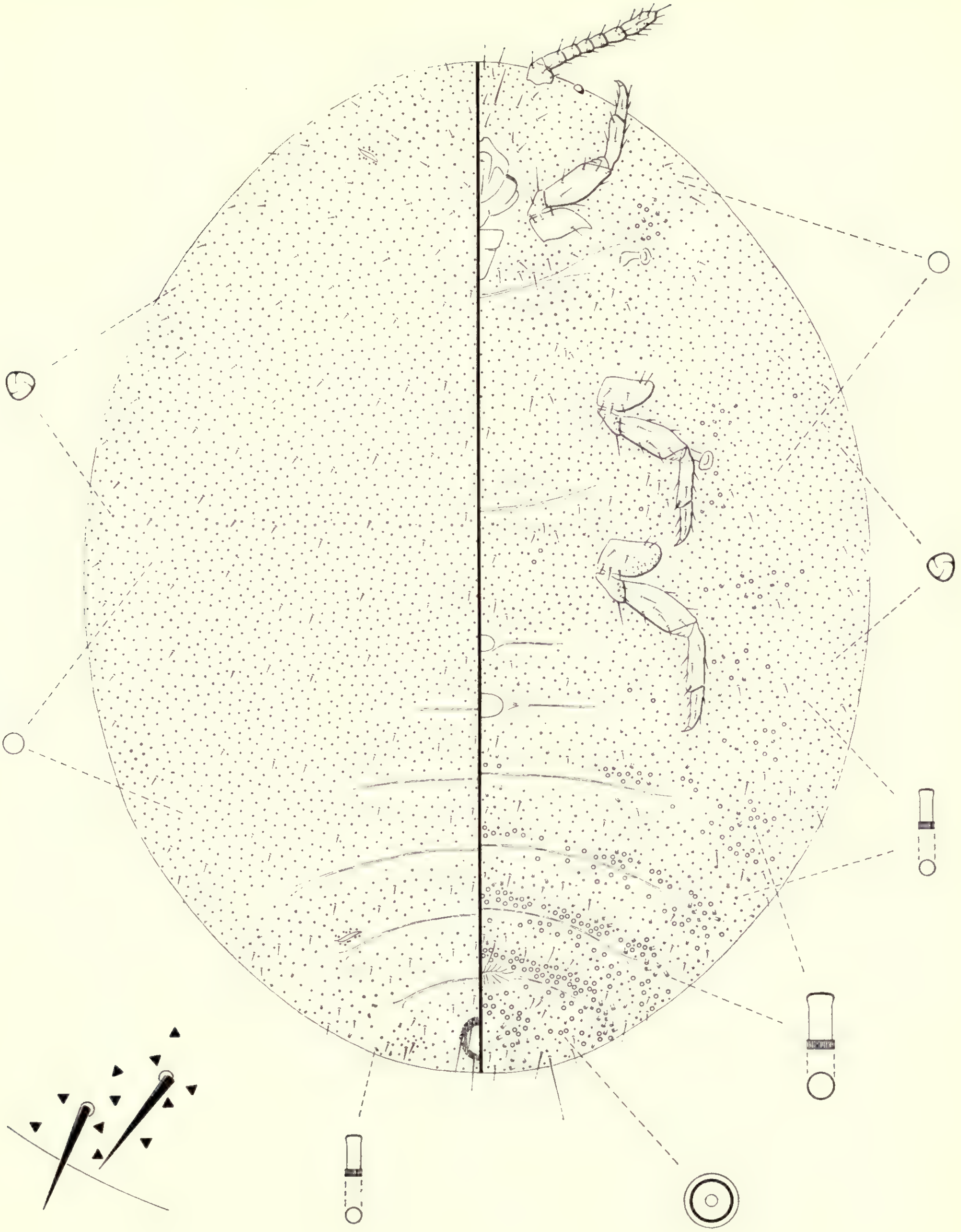
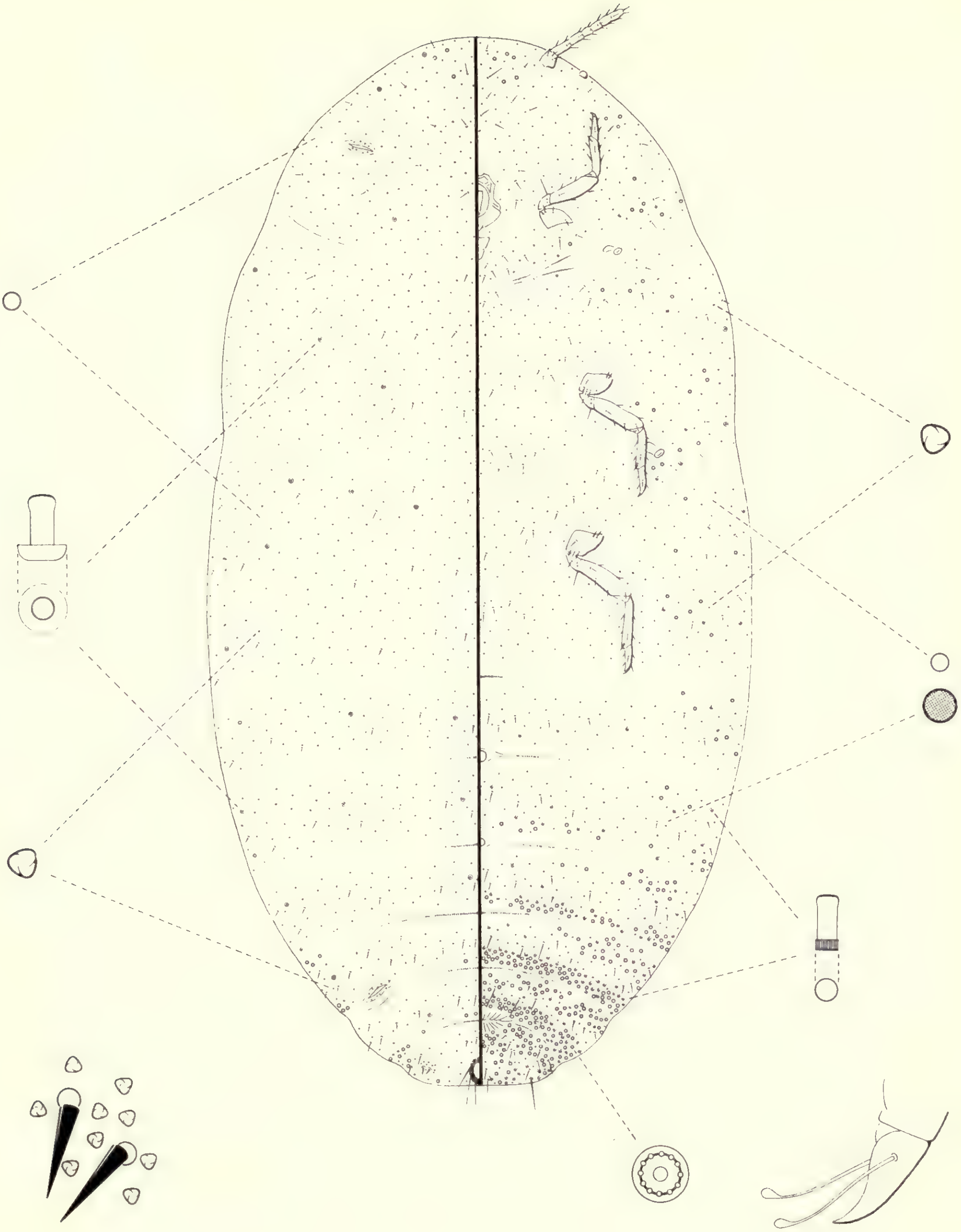


Tridiscus biumbelicatus sp. n.



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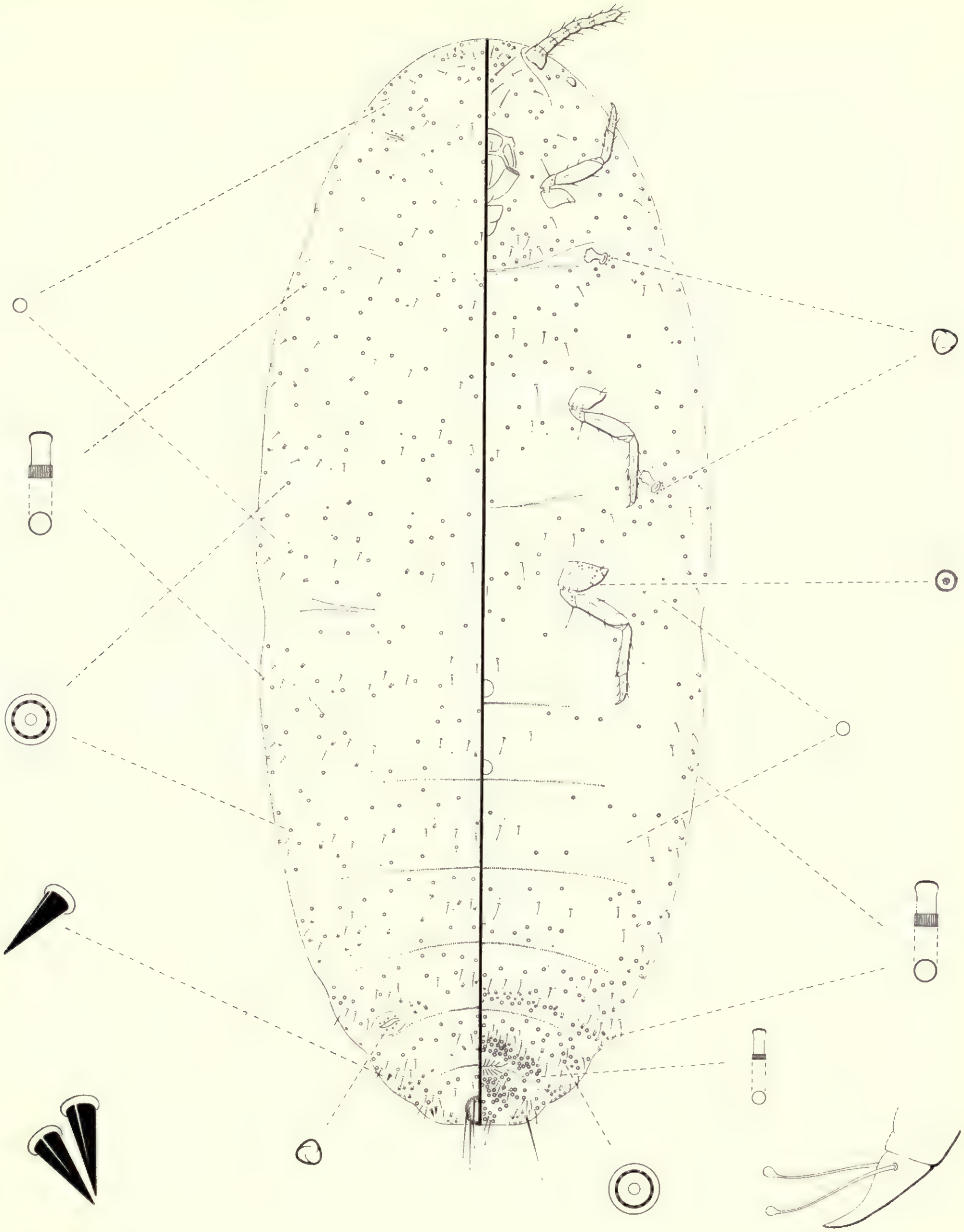

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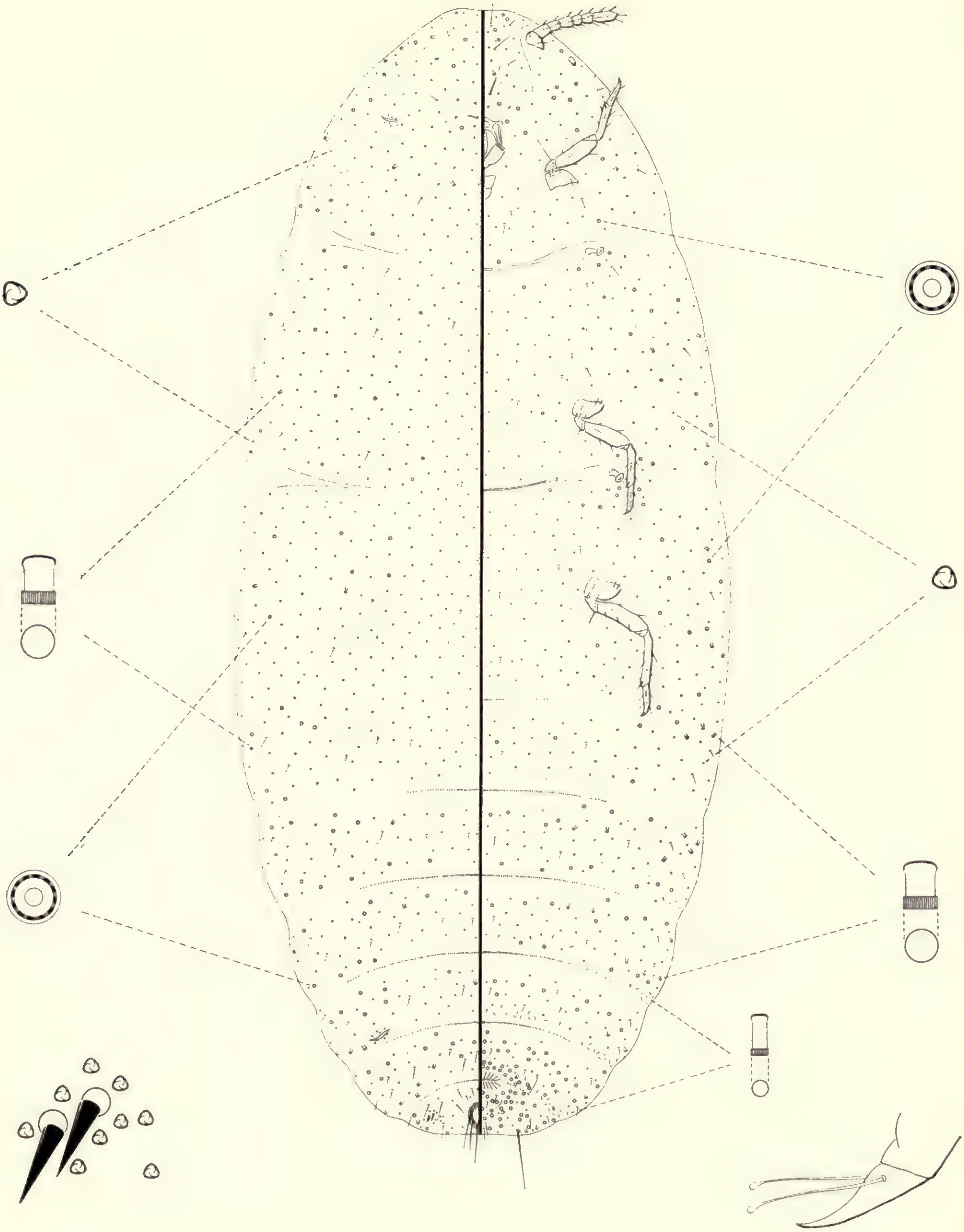
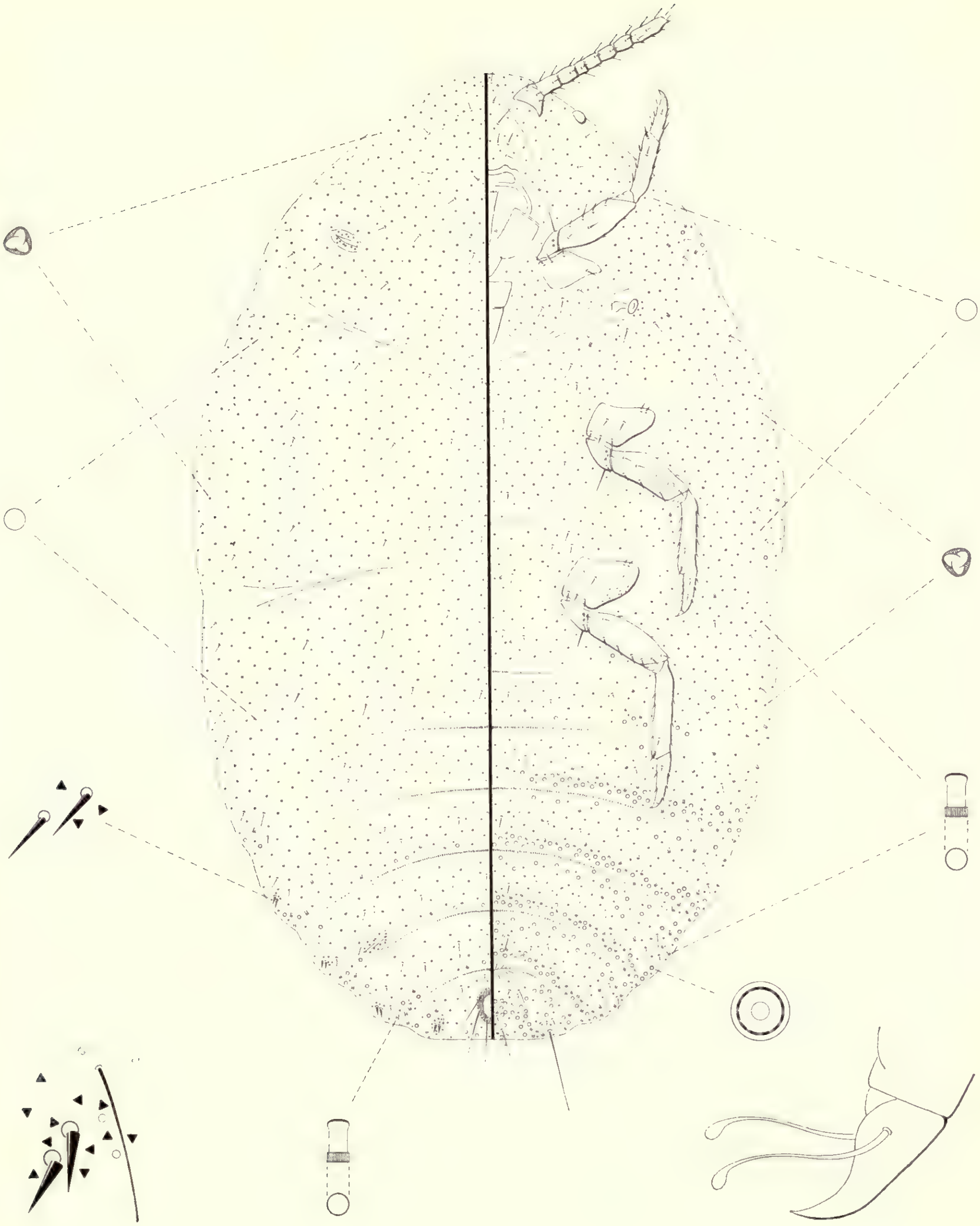


Trionymus acomus sp. n.



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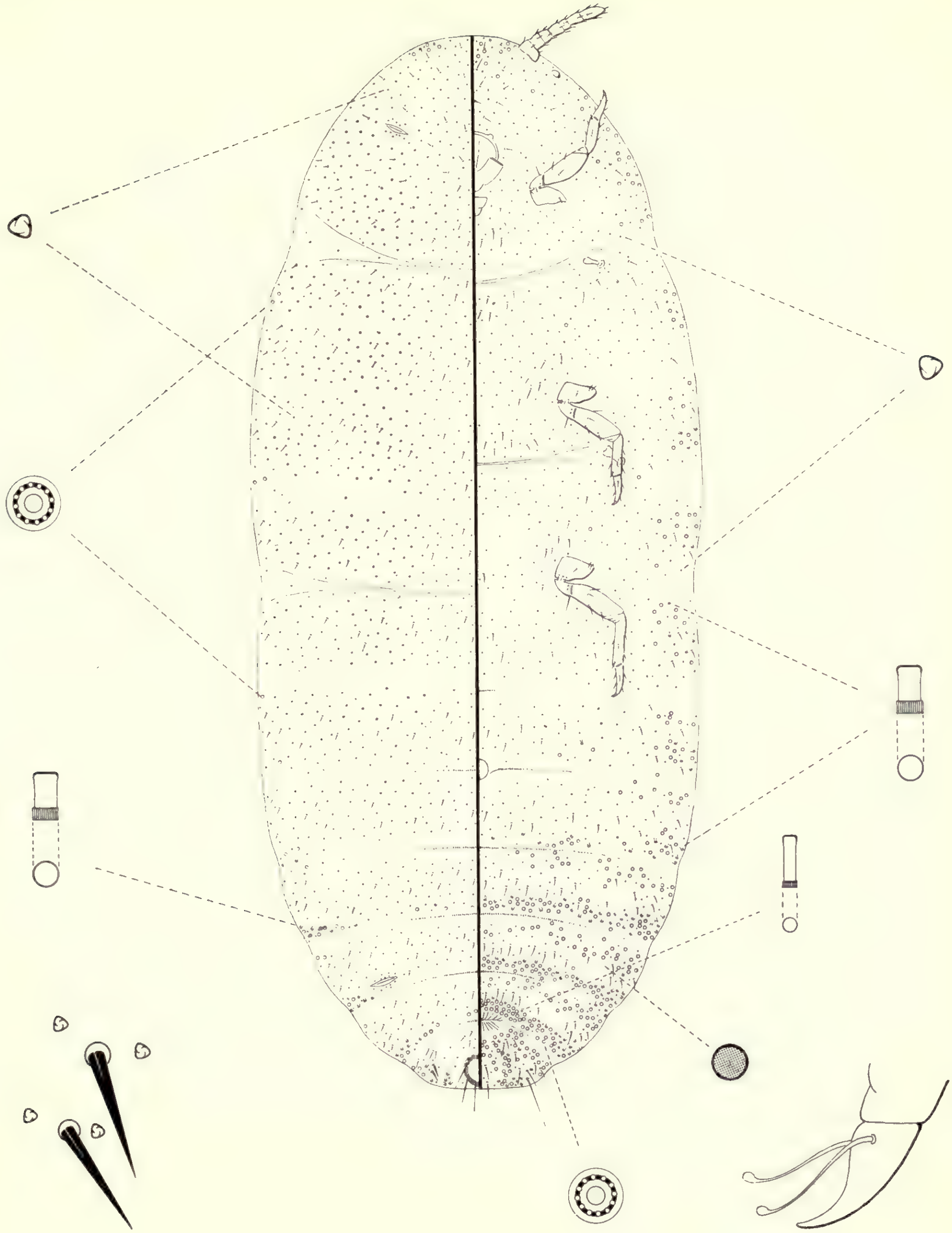

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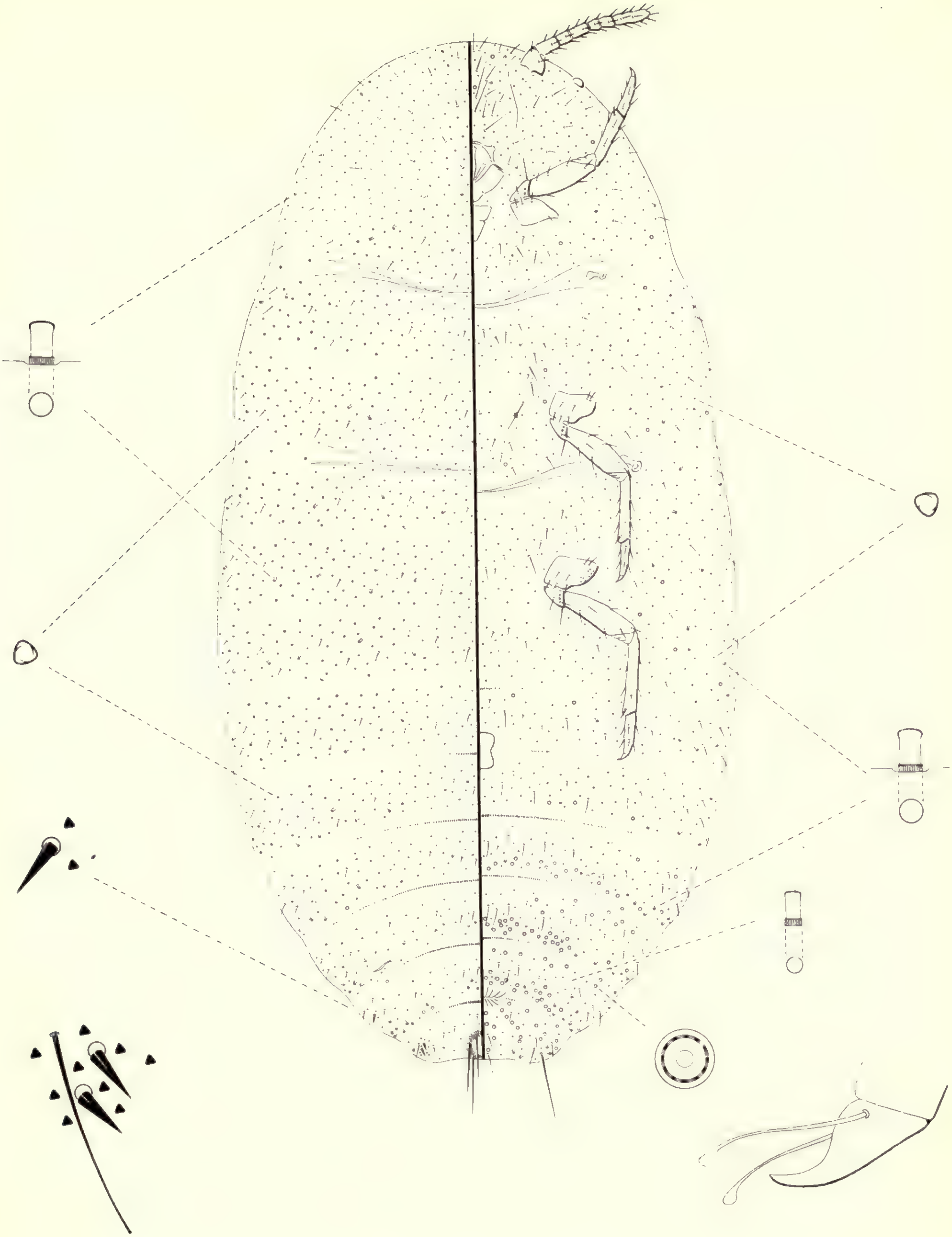

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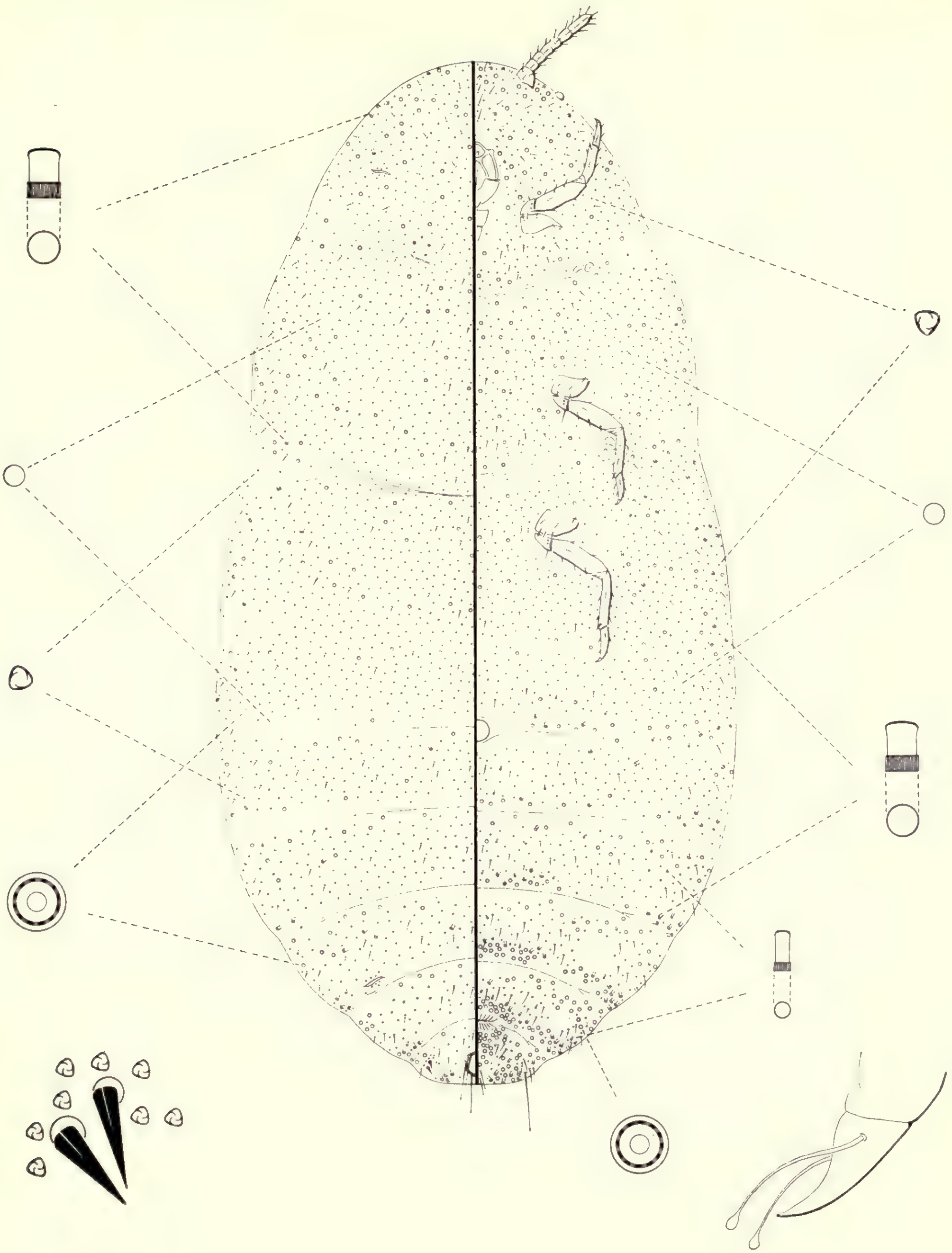

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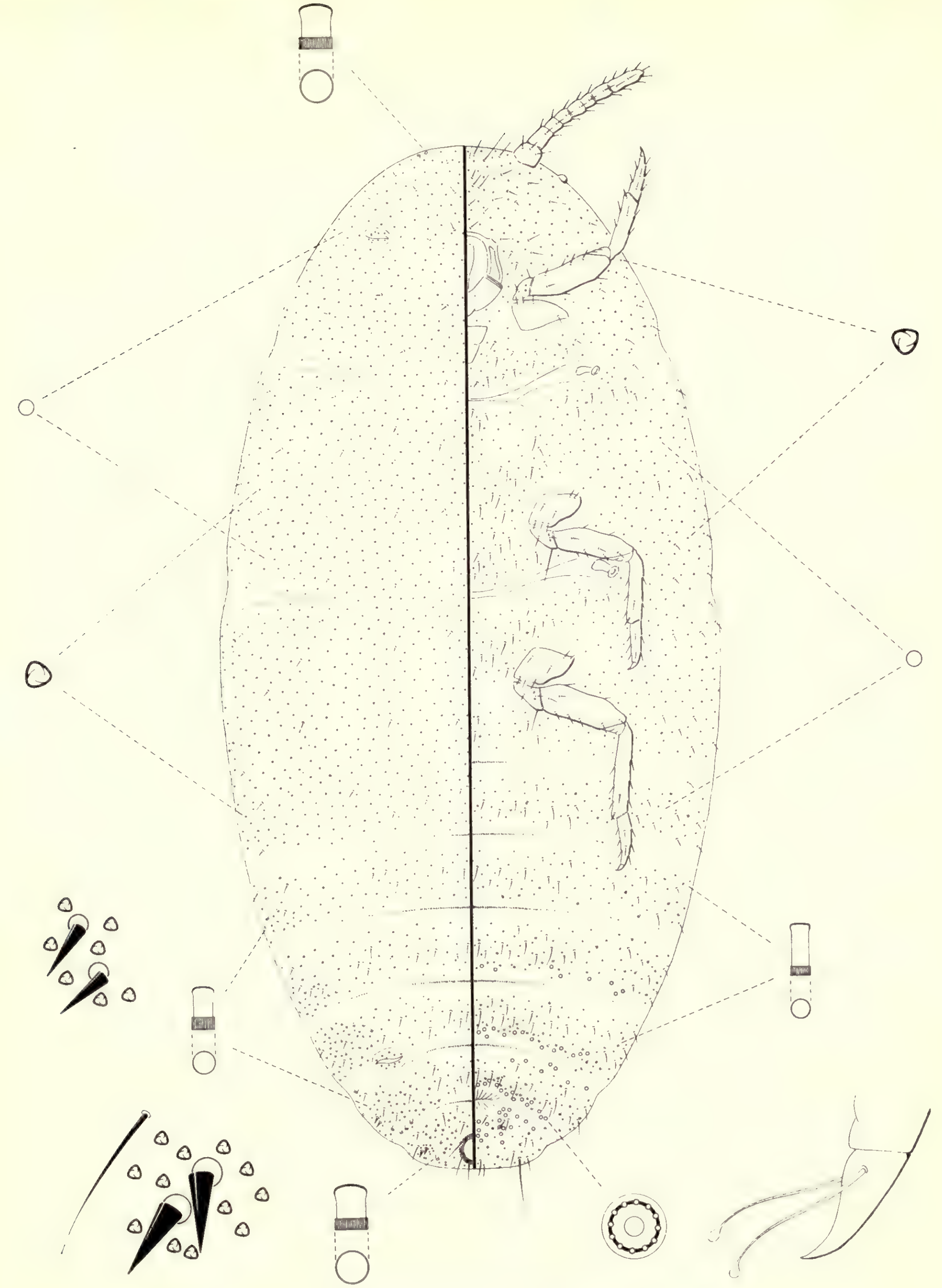

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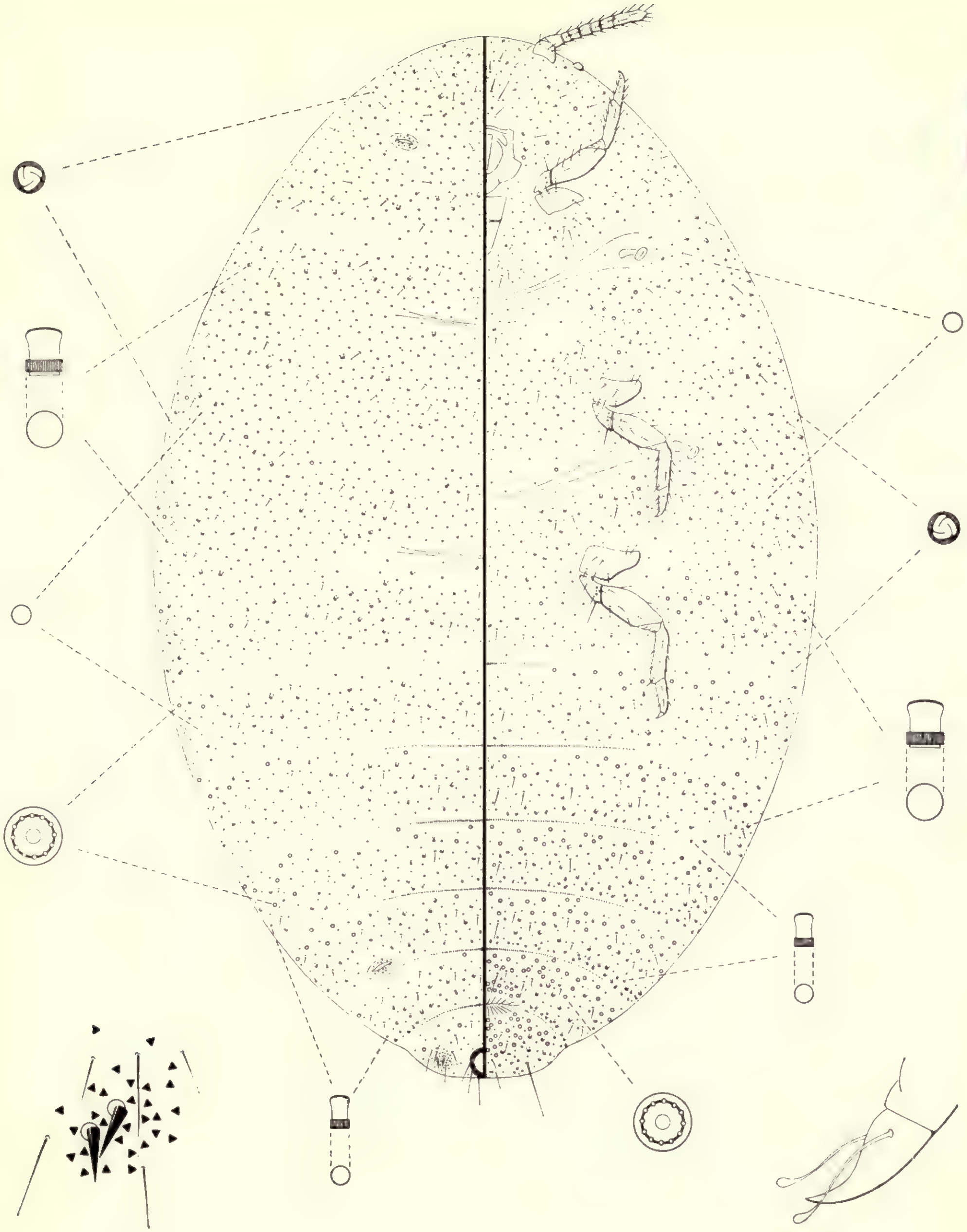

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